Western Industry

June 1957

4th annual plant maintenance & engineering issue

The flow of millions of gallons of wine [illegible] cause any apparent damage to the 2-in. Tenite butyrate plastic pipelines (along ceiling in this view) that link storage tanks and bottling room.

Special Report Published

Western Plants Told How to Use Plastic Pipe and Fittings

SAN FRANCISCO, June 12—The specialty applications where plastic pipe and fittings can result in big savings for Western manufacturing and processing plants of all types are pinpointed in a special report published today by *Western Industry*.

Asserting that hardly one Western plant in every 100 is yet fully aware of the types of plastic pipe and fittings available today for industrial use, the report gives Western industrial purchasing agents, plant engineers and maintenance men the facts they need to start buying and using both conventional and special types.

Features of the report, in addition to "how and when to use" details, are: a chart listing the characteristics of present day plastic pipe; a review of the latest and best "know-how" manuals on plastic pipe and fittings available from manufacturers; and a directory of manufacturers with their Western distribution outlets indicated.

According to *Western Industry* Managing Editor Peter A. Dickinson, who prepared the report after weeks of research and field observation, the possibilities are broad but selective choice of the proper pipe is of key importance.

He cites many important advan-

Dirty Plants Condemned, Remedies Revealed

"'Dirty' industrial plants run labor costs up and open the door to many other types of losses," said one of the West's leaders in the plant housekeeping field today.

Ways that mechanization and new products can eliminate such losses were revealed in an exclusive interview with *Western Industry* magazine, reported in the June issue.

Incentives for Maintenance Workers?

SAN FRANCISCO, June 12—A survey of 60 Western plants has revealed that few have yet established successful incentive plans for maintenance craftsmen, it was reported today in *Western Industry*, the publication making the study.

Only a single plant from the entire group was found to have a progressive incentive program for personnel. Other [illegible] experimenting [illegible] to the re-

Panel Tells Newest Ideas For Plant Care

The newest approaches to systematized maintenance that are especially applicable in Western plants are disclosed by a panel of fifteen Western authorities in a special symposium section of the June *Western Industry*.

The range of subjects covered by the panel—from effective organization of maintenance manpower, to specific techniques and tools for equipment care—is indicative of the broadening responsibilities of the men who [illegible] increasingly complicated [illegible] ery, according

Because th[illegible] erners

see page 39

8 pages (83-90)

35 pages, 46-82

50 best industrial flooring and floor care manuals . . . p. 98

25 best manuals on all types of industrial lighting . . . p. 95

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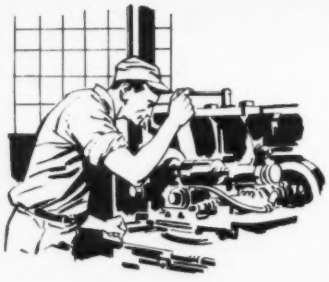

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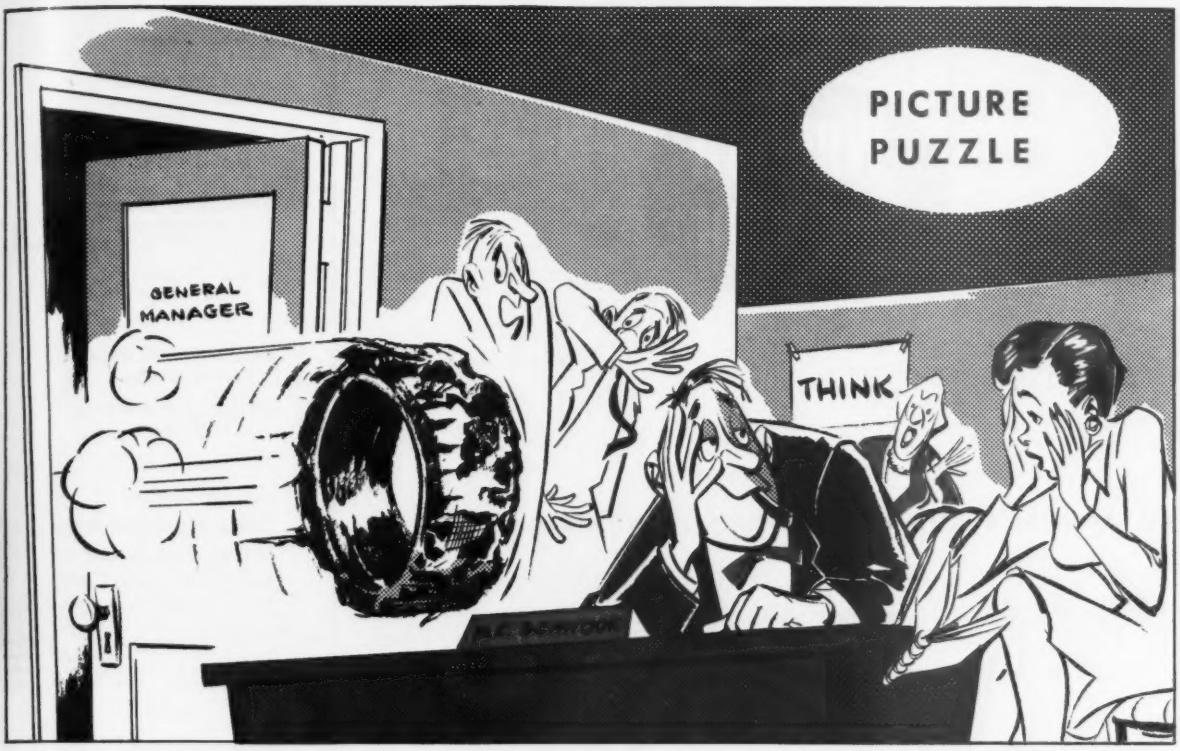

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Analysis? Slow down? Why didn't you save valuable time and specify MONARCH tires!

Monarch? What's so special about them?

You amaze me, Schnook! Don't you know MONARCH is the only industrial tire manufacturer specializing in solids? That their development-engineering and production facilities concentrate on producing the best solids on the market?

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KING PUBLICATION

JUNE, 1957
Vol. XXII, No. 6

4th ANNUAL PLANT MAINTENANCE & ENGINEERING ISSUE

SHOULD YOU USE INCENTIVES FOR MAINTENANCE? 39

The West lags in both application and knowledge of incentives in this phase of plant operation. Special WI survey tells the story.

THE NEW WAYS TO KEEP YOUR PLANT CLEAN 42

A dirty plant devours dollars. Here's how to save 'em, told in a significant WI interview with a Western plant housekeeping expert.

HOW TO KEEP WESTERN PLANTS HUMMING 46

A special symposium, with 15 Western authorities describing the newest approaches and techniques for systematized maintenance.

HOW, WHEN, WHERE TO USE PLASTIC PIPE 83

In three parts: (1)—Description of today's application techniques and types available; (2)—Complete directory of manufacturers and Western distribution outlets; (3)—40 best manuals on plastic pipe, yours for the asking. (Section is printed in green.)

25 BEST MANUALS ON INDUSTRIAL LIGHTING 95

Yours for the asking, covering both selection and maintenance details.

50 BEST MANUALS ON FLOORING, FLOOR CARE 98

They're yours for the asking, using the WI Reader Service Postcard.

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New from Louis Allis — *the most compact and efficient synchronous induction motor on the market* ... the revolutionary "Syncro-Spede." It's the *only* synchronous motor built in standard NEMA frames for comparable ratings in any enclosure.

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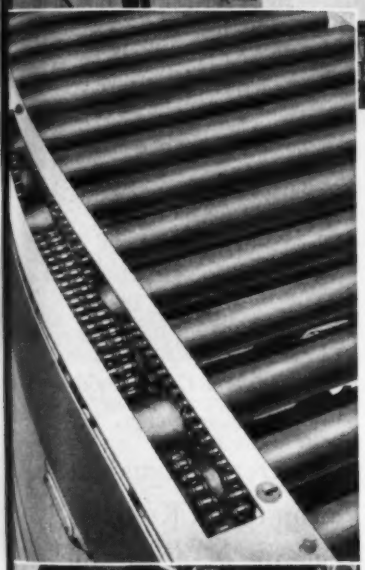

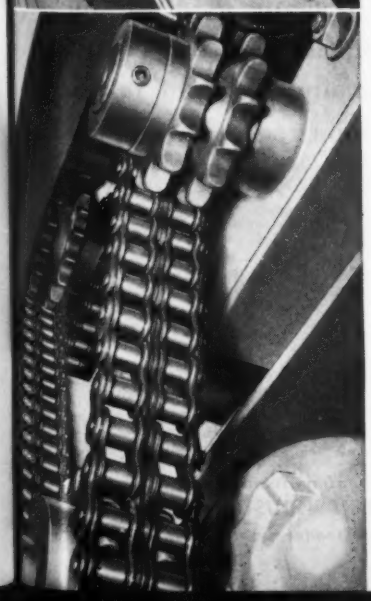

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Here dependable, non-slip, long-life Diamond Roller Chain drives are of prime importance—*there are no other outlets for the production lines.*

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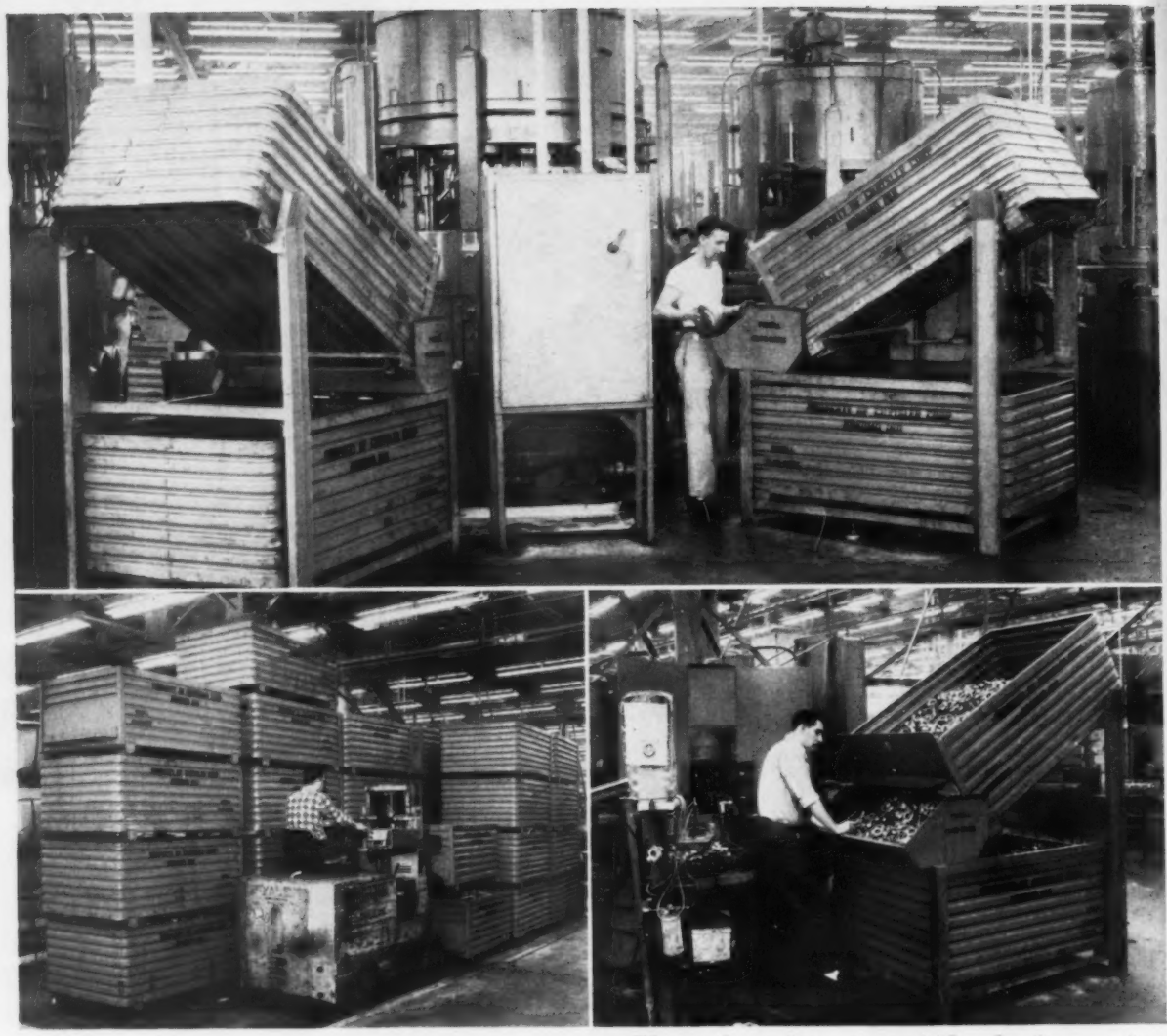

Photos through courtesy of Chrysler Corporation.

Preconceived Mass Handling is possible when a manufacturer designs and builds a plant from the ground up. That's what the Chrysler Corporation did at Kokomo, Indiana. The entire plant was constructed to meet the requirements of a specific operation in the most modern and efficient manner possible. They selected the **Powell Flowmatic*** materials handling system . . . by far the most economical and fastest operating mass handling equipment available today. Literature upon request.

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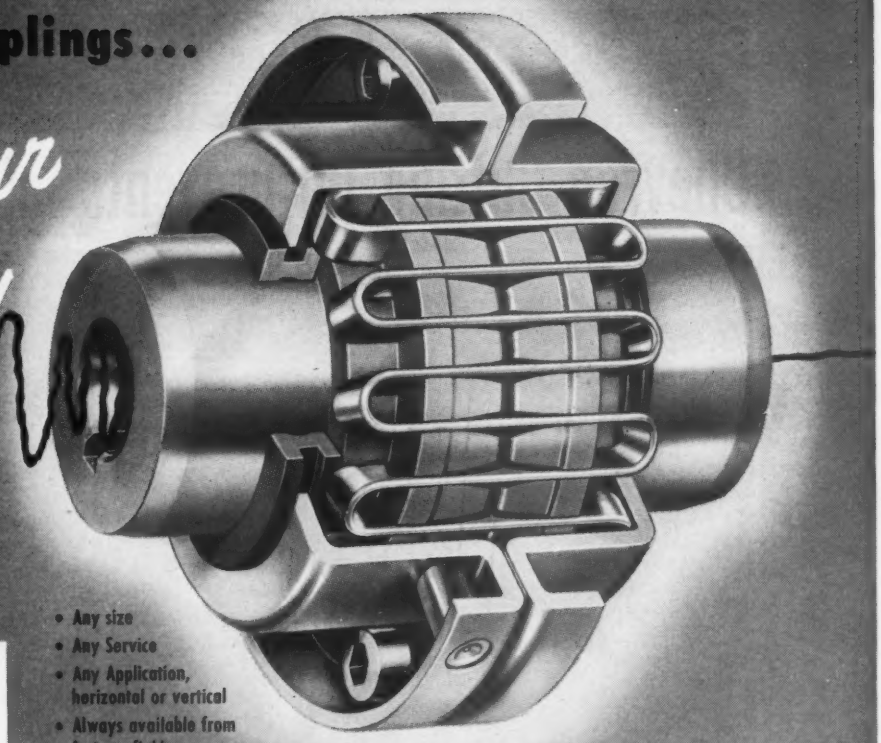
Protect your machinery in 2 ways



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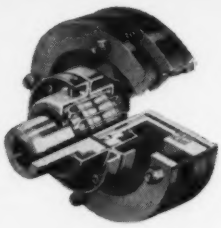
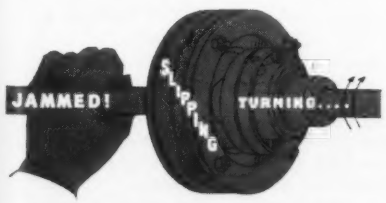


Falk Controlled Torque Couplings prevent damage from overloads

In applications where danger from overloads exists, use the FALK Type FT Controlled Torque Coupling. The Type FT has all the features and advantages of standard FALK Steelflex couplings—and, in addition, has an adjustable friction slip clutch, enabling the operator to set the coupling to slip at any predetermined overload.

This controlled-torque principle not only prevents transmission of dangerous shocks and limits overloads; it eliminates the breaking of shafts caused by jamming of driven equipment.

An outstanding advantage of the Type FT Coupling is that, as soon as the cause of the overload is removed, the entire coupling will rotate and transmit power without replacing parts or repairing coupling.



There's real economy in using Type FT Controlled Torque Couplings. Many users have reported that these couplings paid for themselves the very first time they slipped (under overload) because of the protection against damaged driving or driven machinery!

...cost less per year of service!

You get *double protection* when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel coupling with the exclusive grid-groove design! First, its *torsional resilience* smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery... are trouble-free and need minimum maintenance ... are easy to install, lubricate and disconnect ... and *cost less per year of service* than ordinary couplings.

One basic Steelflex design—the type F, in its many sizes—is adaptable to more than 90% of all industrial applications. For applications involving danger from overloads, Modified Type FT Controlled Torque couplings (see column at left) are ideally suited. There are numerous other special or dual purpose Steelflex couplings for unusual applications. **Write to Department 247** for engineering bulletin, including selection and dimension tables.

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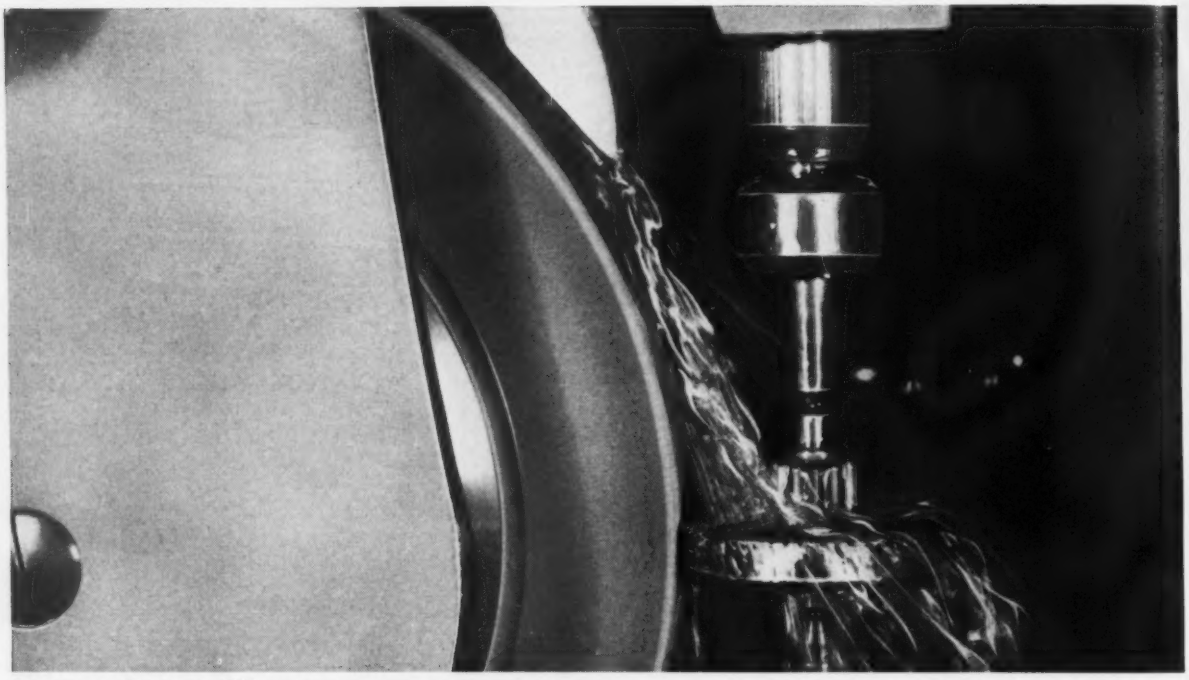
STANDARD ENGINEER'S FIELD REPORT

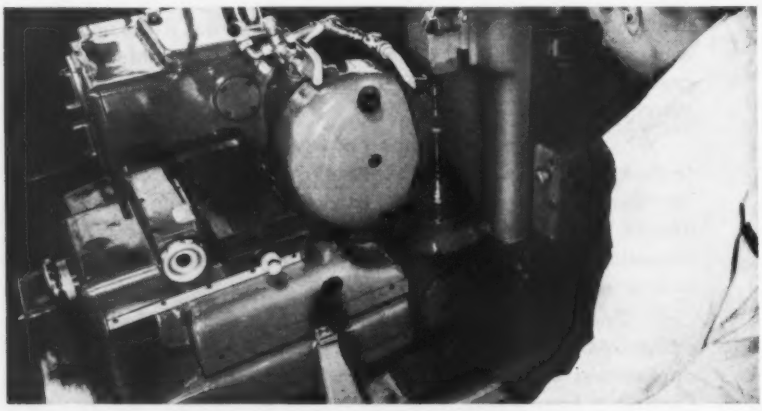
PRODUCT CHEVRON CUTTING FLUIDS

FIRM WESTERN GEAR CORP. Lynwood, Calif.

Chevron Cutting Oil prevents missile gear burning

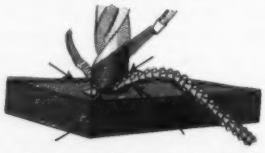


Chevron Cutting Oil (formerly Calol) keeps this 1800-rpm abrasive wheel from burning guided missile control gears as they are ground to close tolerances on Reishauer precision grinder. Western Gear Corporation tried various other lubricants, finally settled on this economical Cutting Oil (210TA) because it eliminates burning during high-speed precision grinding.



Swiss-made Machine controls grinding by speed of spindle and pressure of work against constant speed abrasive wheel. On gear shown, total of accumulated spacing error between any two teeth is .0001". High cooling and lubricating qualities of Chevron Cutting Fluids help make this accuracy possible. They do not separate, turn rancid, let work rust.

Why Chevron Cutting Fluids solve metal-cutting problems



- Have high cooling and lubricating qualities—increase tool life
- Assure precision finishes
- Additives protect against extreme pressure, corrosion and rust
- Very stable—will not separate or turn rancid
- Specialized products for every metal-cutting operation

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OFFICE OF THE PRESIDENT
T* WESTERN MANUFACTURING CO.

June 14, 1957

To: The Plant Operating Executive Team

NEW COMPANY POLICY ON MAINTENANCE MANAGEMENT

This is to notify you that our Maintenance Superintendent is being delegated broadened responsibilities and authority, effective immediately. Henceforth, he will be present at our weekly plant operating management committee meetings.

The scope of our new policy on maintenance will be described fully by the Maintenance Superintendent at our next meeting, Monday at 2 p.m. in my office.

Briefly, he will describe the planned reorganization and expansion of our Maintenance Department, a new program for training of all department personnel in effective utilization of the newest maintenance techniques and tools, and the gains that we must accomplish through maintenance that is increasingly systematized.

The need for this development has become sharply apparent to all of us.

During the past few years, along with hundreds of other Western plants, we have had to rush the planning and provision of our new production facilities to keep our growth in step with the mushrooming market created by the West's explosive population growth and a consequently rapid industrial maturation here.

Many of our plant and equipment decisions have been finalized with an unfortunate inattention to maintenance requirements, while at the same time the increasing mechanization of our production techniques has been demanding more and more maintenance skills and man-hours.

By 1960, it is probable that we will have more maintenance workers than production personnel. Already we are developing a serious shortage of the skilled manpower that we need to maintain and troubleshoot the complicated equipment we are installing for handling, processing, fabricating, packaging and distributing our products in a more highly mechanized manner.

We have urged our nearby university to add courses in maintenance management to its curriculum. If these efforts are successful, we will then have available a growing supply of men especially trained for the challenging maintenance jobs we will be facing.

Action at our following meeting will be a discussion based on the content of Western Industry's June 1957 Annual Plant Maintenance & Engineering Issue. The descriptions there by twenty maintenance experts of the newest approaches to systematized maintenance provide us with ideas that can be utilized immediately.

The authors are all Westerners, so we can be sure that their thoughts and experiences are applicable and of proven worth under Western plant operating conditions.

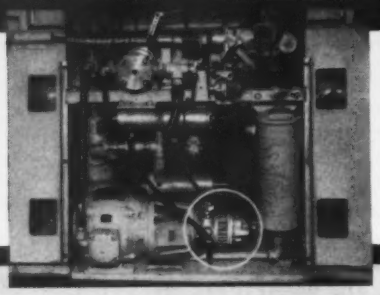
I will expect you at 2 p.m. on Monday.

***TYPICAL**

A SPECIAL WESTERN INDUSTRY EDITORIAL—THE NEW SKILLS THAT MAINTENANCE NEEDS

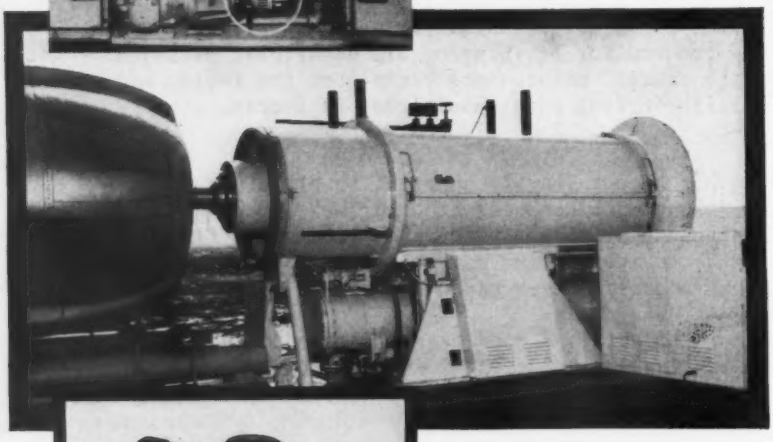
TWA COUNTS ON ROPER DEPENDABILITY

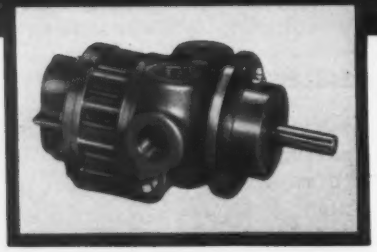
for Efficient Operation of Engine Test Stand



NERVE CENTER OF THE UNIT

Oil used as the power absorption medium in this dynamometer is supplied to the inlet control valve by a Roper Series F Pump. Four other Roper pumps are integral for pressure lubrication and hydraulic actuation of this unit.





ROPER SERIES F PUMP

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This 5000 HP Absorption Dynamometer, one of five specially designed for TWA by Clayton Mfg. Co., El Monte, California, is the newest concept of aircraft engine testing and run-in. Its use is based on a principle of power absorption, and thus replaces the club propeller used on conventional test stands. The unit is proved to be a quicker, more accurate means of testing than has been previously available. Standard Roper Series F Pumps were specified by Clayton for inclusion in the nerve center of the unit. It is another example where design men call upon Roper because they know of Roper dependability.

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ROPER *Rotary Pumps*

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LETTERS

"Trade show in print" pays off in two ways

EDITOR—We wish to thank you for the excellent preview of the Western Metals Exposition in your March issue.

In the course of reading the exhibit previews, it was discovered that a specific technique was to be demonstrated in which we have considerable interest. Because of this article, additional personnel attended the Exposition and, I might add, they obtained beneficial results.

This type of pictorial and verbal preview is very valuable not only to industry but also to exhibitors as it enables industry to send specific personnel to view specific exhibits which otherwise might not have received the attention they deserved.

It is hoped that this type of reporting will continue.

JOHN G. THOMPSON
Production Manager, Motorola Inc., Phoenix Research Laboratory, Phoenix, Ariz.

(In view of the special value for Westerners of our new "trade show in print" sections . . . as evidenced by Mr. Thompson's comments and many similar ones received from other readers, we can say with assurance that "this type of reporting" by WI editors will precede all of the West's major broad-interest trade shows.—Ed.)

Case of the missing postcards (solved)

EDITOR—Other men have taken the Reader Service Postcards from the last issue of WESTERN INDUSTRY before it was passed over to me. So, I hope this note will substitute for the Postcard in requesting the manuals listed herewith.

FRANK O. GELLERT
Engineer. Boeing Airplane Co., Seattle, Wash.

EDITOR—Unfortunately, my sons tore out the Reader Service Postcard from the March 1957 issue of WESTERN INDUSTRY, so I must use this letter to request some of the metals manuals listed.

Even though our field is somewhat detached from facilities layout, we could not help but admire the fine article, "How to Earn $1,000 per

. . . continued on page 18

NEW

HORN

SUPER-BONDSIT

for topping, resurfacing and patching interior and exterior concrete surfaces

Super-Bondsit is a white liquid latex emulsion which when added to cement floor topping (in place of most of the mixing water) offers these cost and quality advantages:

- Bonds to most seasoned concrete surfaces *without the need to roughen the surface*
- Self Curing! Wet curing should not be used to develop full strength—no finishing delay
- Absorbs heavy impacts—does not chip or dust
- Provides a slip-resistant surface
- Mortars, plasters, and concretes, when combined with Super-Bondsit, will bond to concrete, masonry, sealed wood, metal and even glass surfaces

For free literature and the name or your nearby Horn dealer or representative, write Dept. H53-67

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MICRO
PLIABILITY
(MICRO-BROKEN GLUE)
plus new
FLASH GRAB
glue formula

Now FLASH-TITE®

gives you both!

Now—an entirely new experience in taping . . . one that will *simplify* your taping operations, reduce taping costs. The NEW *diagonally broken* FLASH-TITE Micro Pliable gummed tape—with amazing new Flash Grab glue formula—does these things for you:

1. Molds itself like a wet cloth around corners.
2. The tiny fractures—formed by micro diagonal breaking—create thousands of water channels in the glue film. The result—far greater wetability.
3. Surface tension of the glue is so *relaxed*—Flash-Tite lies *flat* . . . troublesome tail end curl is eliminated.
4. *Initial tack* is greatly speeded up. Yet, we have kept Flash-Tite's traditional quality of staying sticky for a long period.

The equipment used in Micro Breaking the new Flash-Tite is the very latest development in diagonal breaking.

Yes, with *Micro Pliable* Flash-Tite—and the new *Flash Grab* glue formula—you will enjoy an entirely new experience in taping ease, speed and effectiveness. Yet Flash-Tite retains the high strength, exceptional printing qualities and clean, smooth surface for which it has always been noted.

Today, more than ever, *for best results under all conditions, use Flash-Tite gummed tape!*

SEND FOR FREE SAMPLE TEST ROLL

of Crown's new Micro Pliable Flash-Tite gummed tape with the sensational new Flash Grab glue formula. Prove to yourself this new Flash-Tite will simplify your taping operations, make taping easier, faster, more effective.

Write for FREE TEST ROLL to Flash-Tite, 343 Sansome Street, San Francisco, California, Dept. 6-I.

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CROWN ZELLERBACH

* *This is a photomicrograph of the new Flash-Tite gummed tape enlarged 80 times.*

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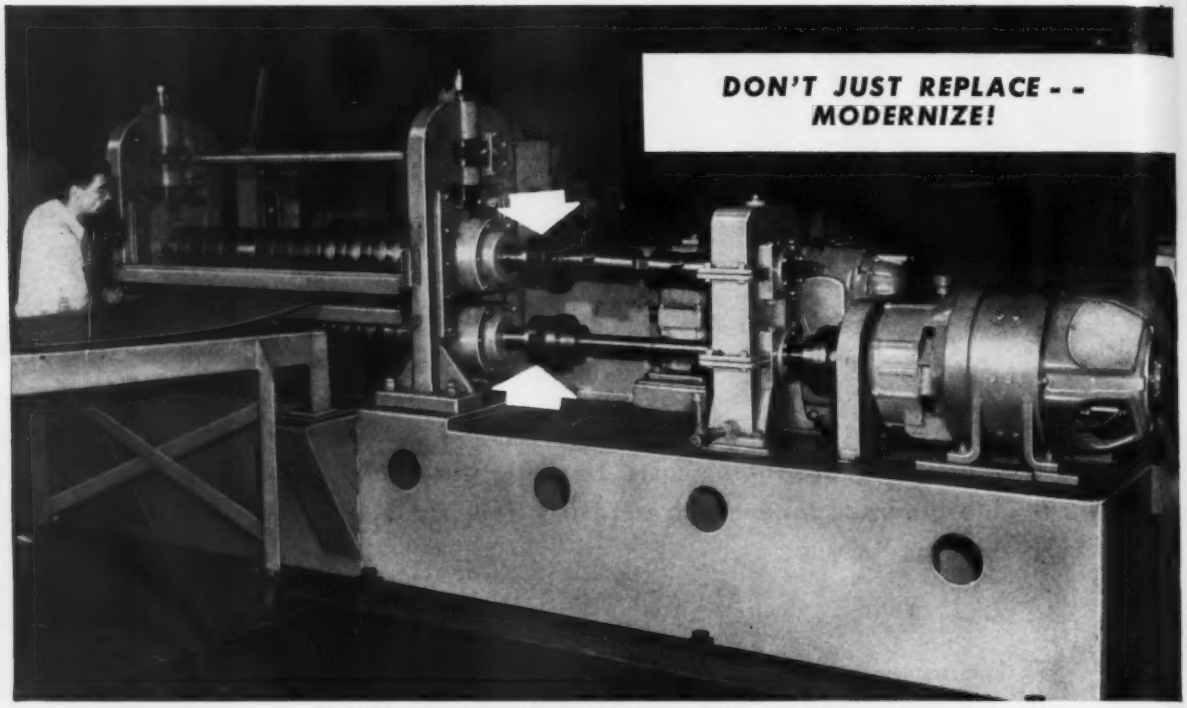
Facts you may not know about progress in free-wheeling devices

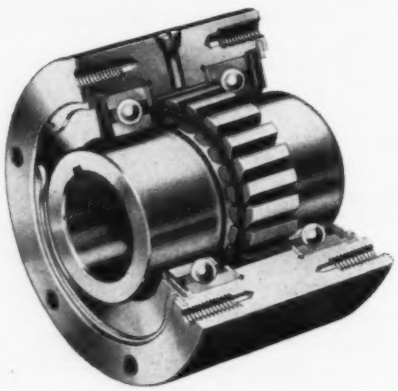


Typical of the modern concept in free-wheeling devices is this Formsprag Over-running Clutch used on a slitter. It allows the take-up reel to pull strips freely and automatically after being threaded in under power.

Progressive equipment manufacturers agree: sprag-type over-running clutches offer a far more accurate method of free-wheeling. That's why so many of them are specifying Formsprag Over-running Clutches on their new products.

Why Formsprag? Patented "D-Shaped" sprags used in Formsprag Clutches offer superior accuracy; maximum torque; and instantaneous contact and release. Slippage, often found in obsolete band brakes and other clutch types, is eliminated.

Best of all, Formsprag Clutches are easily adapted to your equipment. Change-over is quickly accomplished. The next time you replace a free-wheeling device, contact your Formsprag Distributor — he knows the complete story; stocks a full line of Formsprag Clutches.



Applications are almost unlimited. Above is a ball bearing clutch model designed for high speed, continuous over-running. It is particularly desirable for dual-drive systems.

This new 26-page brochure is crammed with tips on the use of Formsprag Clutches. Your free copy is waiting.

OVER-RUNNING, INDEXING AND BACKSTOPPING CLUTCHES. YOUR LOCAL POWER TRANSMISSION DISTRIBUTOR STOCKS THEM; OR, WRITE

FORMSPRAG COMPANY

23619 Hoover Road • Van Dyke (Detroit), Michigan

WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF OVER-RUNNING CLUTCHES

A15-6C

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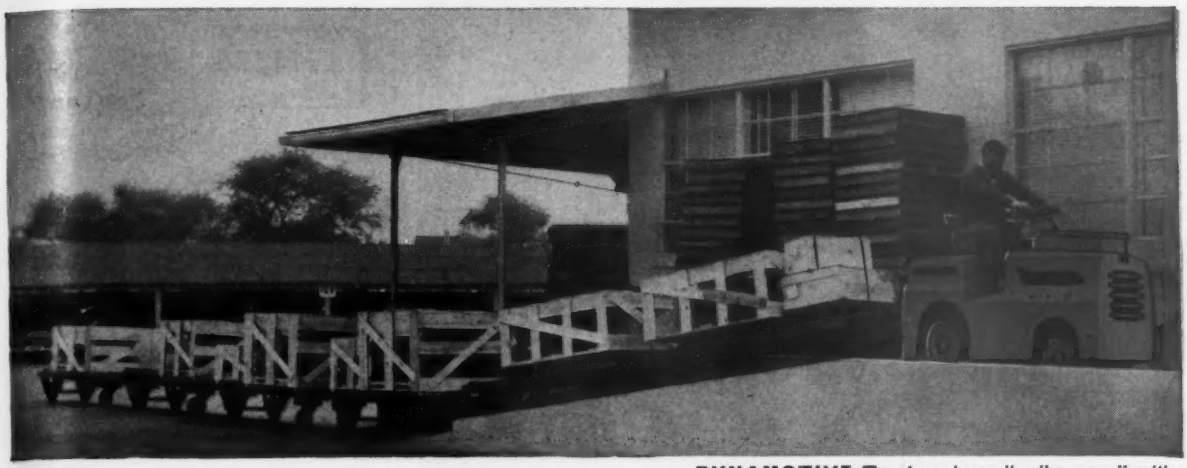

DYNAMOTIVE Tractor above "walks away" with 19,225 lb. load up 12% grade at Robbins & Myers plant.

NOW...A GAS TRUCK THAT DOES MORE WORK ON 25% TO 30% LESS GAS...

Automatic DYNAMOTIVE

The secret of Automatic DYNAMOTIVE'S (GLF Series) proved superior performance lies in its utter simplicity...an engine-driven variable voltage generator supplies electrical power to the drive motor direct coupled to the drive axle. This proved power train *without gears* eliminates slippage and power loss through heat build up. Additional gas mileage is achieved by the inherent overdrive and torque multiplying features of the electric power train.

Among many other advantages are the following:

Positive Inching Control...precise spotting gives faster, safer handling of loads.

Job Adjustable...directional control can be adjusted... on the job...for instant power or cushion-smooth takeoff.

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Full Width Posture Seat...accessible from either side ...reduces driver fatigue.

Visibility...high visibility of fork position throughout lifting range.

Safety...Dynamotives are listed by Underwriters' Laboratories Inc., and Factory Mutual Laboratories.

G.L.F. Capacities: 4,000 to 10,000 lbs. with solid tires... 4,000 and 6,000 lbs. with pneumatics. Tractors available in 2,500 and 3,500 lbs. draw bar pull.

But see for yourself. *Ask for demonstration* and/or complete specifications with case histories of installations similar to your own. No obligation...write today.

Part of a **DYNAMOTIVE** "fleet" used for warehousing, loading, etc. Calumet Industrial District Co.

This **DYNAMOTIVE** unit paid for itself in one year says Lock Joint Pipe Company official.

Factory service available in over 100 cities.

Automatic

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Chicago 20, Illinois

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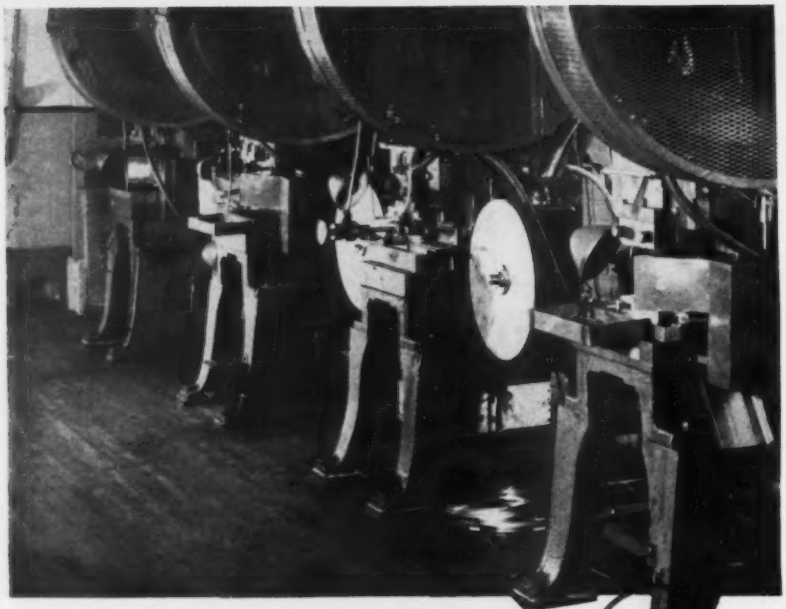

Unisorb
Cuts Machinery
Installation
Costs up to 30%

It's always surprising how much you can save by mounting your machinery on Unisorb. Here are the four big money savers:

- Forget about bolts and lag screws. No holes to drill, legs to center, floors to be patched.
- Save up to 30% on labor and materials.
- Heavy machinery can be on the job in hours saves up to 80% on installation time.
- Unisorb holds for keeps, yet can be unbonded when required. No maintenance, no checking required.

All this plus the ability of Unisorb to reduce transmitted vibration by as much as 85%!

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FES-21

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LETTERS

. . . continued from page 12

Hour In Planning Your New Plant," by Mr. Palmer.

Thank you for your wonderful service.

PHILIP TRIPOLI
Producibility Design Engineer, Northrop Aircraft, Inc., Hawthorne, Calif.

(The two postcards in each issue of WI are provided as the most convenient means for readers to obtain manuals and more product information. Their use is not mandatory to take advantage of this special service —any sort of communication to us will obtain for you the material you want, as long as your name, title, company and address are included and your request is received within 2½ months after publication of the issue in which it is offered.—Ed.)

Reprints requested (and promptly sent)

EDITOR—First, let me say that WESTERN INDUSTRY is a very interesting and informative periodical. Especially noteworthy are the articles concerning the aircraft industry.

In our particular phase of the business, the primary function is to project future manufacturing costs for the purpose of pricing follow-on business. In order to perform this function, we are making practical application of the learning curve.

In a publication of the National Association of Cost Accountants there was a reference to an article in the September 1952, WESTERN INDUSTRY, titled "The Learning Curve." I have tried all over our fair city to obtain this issue, but have not been able to do so. I would certainly appreciate anything you could do to get me on the trail of this article.

RONALD BRENNECK
Cost Administrator, Cost Division, Ryan Aeronautical Co., San Diego, Calif.

EDITOR—In reading the March issue of your magazine, I was extremely interested in the article "How To Earn $1,000 Per Hour In Planning Your New Plant." If you have tear sheets of this article available for free distribution, I would appreciate a copy for ready reference in my office.

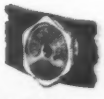
W. NOBLE KIRKPATRICK,
Chief, Transportation Division, The Zia Company, Los Alamos, New Mexico.

New narrow LIFT-FRONT *helmet*

Light, most practical, work-easy and see-easy, this NEW Fibre-Metal Helmet is a most wanted companion to the very popular 666-9!

Sturdy shells, from a flat sheet of fibre with deeply lapped seams sealed by oversize rivets, have a narrow straight line-of-sight shape for close-quarter work with sides extended deeper than ordinary helmets for maximum protection against side flashes. No. 668-9 has a NEW exceptionally light No. 1176 Dowmetal lift front, insulated on the inside of the helmet.

Headgear has two positive stops, two position joints equalizing movement, and is now equipped with the famous Wide Range Ratchet Adjustment to accurately fit all head sizes. All Helmets are furnished with padded sweatband for additional comfort and all parts are easily replaced.



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Quick, positive, completely enclosed and insulated from head! No hair pulling!

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Over 50 Years of Welding and Safety

THE FIBRE-METAL PRODUCTS COMPANY

CHESTER, PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURER OF SUPERIOR PROTECTIVE EQUIPMENT

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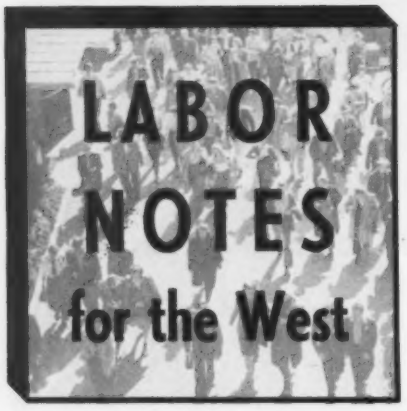


A WORK-STUDY PROGRAM FOR ENGINEERING UNDERGRADUATES has been initiated by the West's largest electronics manufacturer—Hughes Aircraft Co. at Culver City, Calif. The new program, with full payment of college tuition and related expenses for students while they work part-time in their chosen fields, is expected to raise to nearly 950 the number of part-time or full-time employees studying for degrees at company expense.

The company currently has nearly 900 employees studying for bachelor's and master's degrees, plus another 20 students for doctorates, under its scholarship program established in 1953.

Under the new plan for undergraduates developed by Hughes and university officials, juniors and seniors in electronic, mechanical and industrial engineering who qualify will work 20 hours per week as student engineers at the company's plant in El Segundo, Calif. Their duties will be tailored to supplement classroom studies, with working hours adjusted to avoid conflict with classes. In addition to pay for their work, students also will receive education grants from Hughes covering their college tuition, lab fees and related expenses.

Students may spend up to three years in the program while completing their college studies. Each work-study student will be permitted to carry from 9 to 13 units of upper division engineering each semester, and 3 to 6 units during each half of the double summer sessions at participating universities (Loyola, USC, and UCLA).

•

NO FOOT-SORE FEMMES HERE—Maytag has devised this traveling eight-seater complete with rear-mounted guide to make tours of its 1,000,000-sq. ft plant easy on the feet and frame. And there's an idea for many an expanding and spacious one-story Western plant.

A TOP-NOTCH SUPERVISOR MAY NEVER BE A GOOD PLANT MANAGER. That's the conclusion of two psychologists at the Berkeley campus of the University of California. Drs. Lyman W. Porter and Edwin E. Ghiselli have just completed a study raising the possibility that success in top management and middle management calls for significantly different personalities.

Good middle management may be erroneously promoted into top management, their study implies. And conversely, good top management candidates may never get a chance at those jobs because on the way up they fail in middle management, for which they are unsuited. This situation shows the need for adequate personality assessment which might be used in the selection of prospective management personnel, the psychologists indicate.

Here's how the study was made. "Adjective checklists" were supplied to 100 top management executives (defined as individuals who set general policies and develop broad plans of operation) and to 170 middle management men (individuals who translate the plans of top management people into workable procedures.) All individuals were asked to check the adjectives in a first group which most closely described their own personalities, and in a second group the adjectives describing undesirable traits in their opinion. The two groups differed significantly on approximately one-third of the 64 sets of adjectives; enough, the psychologists believe, to make the following tentative conclusions possible.

Members of top management see themselves as being active and self-reliant persons, who are willing to take action on the basis of faith in themselves and their abilities. They are willing to take risks when they think they have good, original ideas and are confident that their decisions will lead to success. They are not discouraged easily and have the ability to take advantage of opportunities.

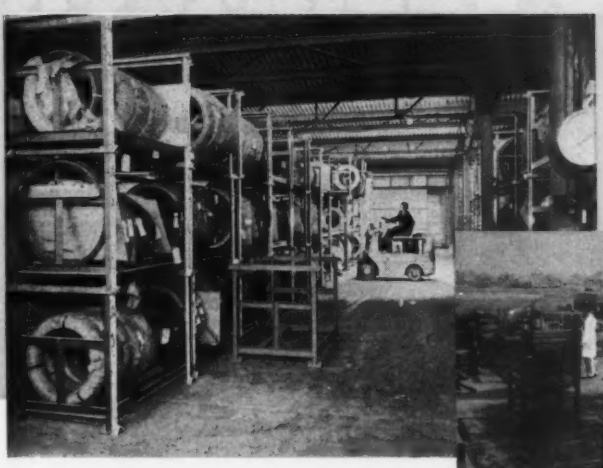
The attitude of middle management personnel toward themselves presents a significantly different picture. They characterize themselves as careful planners who seldom take actions that are not well thought out in advance. They can be counted on not to make hasty or unfounded decisions and do not appear to be as willing to take risks or to move ahead when the final outcome is uncertain. They do not show the same sort of confidence in their own judgment which characterizes members of top management. In general, the middle management individual seems to describe himself as a stable and dependable person who tries to avoid making mistakes on the job and elsewhere.

The results of this experiment may provide an explanation for the problem of ineffective management which seems to plague some organizations. Drs. Porter and Ghiselli say that some organizations may have the right men in the wrong places. Men with personality traits characteristic of middle management may be in top management positions, and vice versa, in these organizations.

If it is true that two different types of people are needed at the different levels, industry is faced with a problem, since most organizations select top management personnel from the ranks of middle management. The best potential top management people might well be found deficient in the characteristics required for middle management while serving in that capacity. Under existing procedures, the likelihood of reaching the top management level would be very small for such persons. It is quite conceivable that a considerable amount of young talent in the management field is being wasted each year through erroneous selection, the psychologists conclude.

. . . continued on page 24

Storage the vertical way pays off in savings of space, labor and time.



LINES THAT SPEAK FOR THEMSELVES

These storage racks are being custom-made at our factory for a leading automobile manufacturer.

GAIN PRODUCTION SPACE BY VERTICAL Storage

UTILIZE that room-high space with Alden Steel Storage Racks and gain room for profitable production equipment. You also increase storage space. Labor is used more productively. Safety is promoted. You keep your storage in better housekeeping order.

Alden custom-tailored racks minimize damage in transport and storage. Loaded sectional racks may be shipped in freight cars or trucks. Alden Racks can be lifted and stacked in place, firmly and securely, due to the special dowel and socket construction.

Alden Racks are engineered to your individual needs — with or without casters — portable or fixed. Solid sides may be had. Collapsible models are available. You can use Alden Racks to handle pallets, for light or heavy loads.

To gain more storage space — to release valuable floor area, to reduce labor and time costs — get all the facts about vertical storage with Alden Custom-tailored Racks.

CONVEYORS
Trolley, Roller, Tow line, Gravity, Vibrating, Belt, Apron Screw

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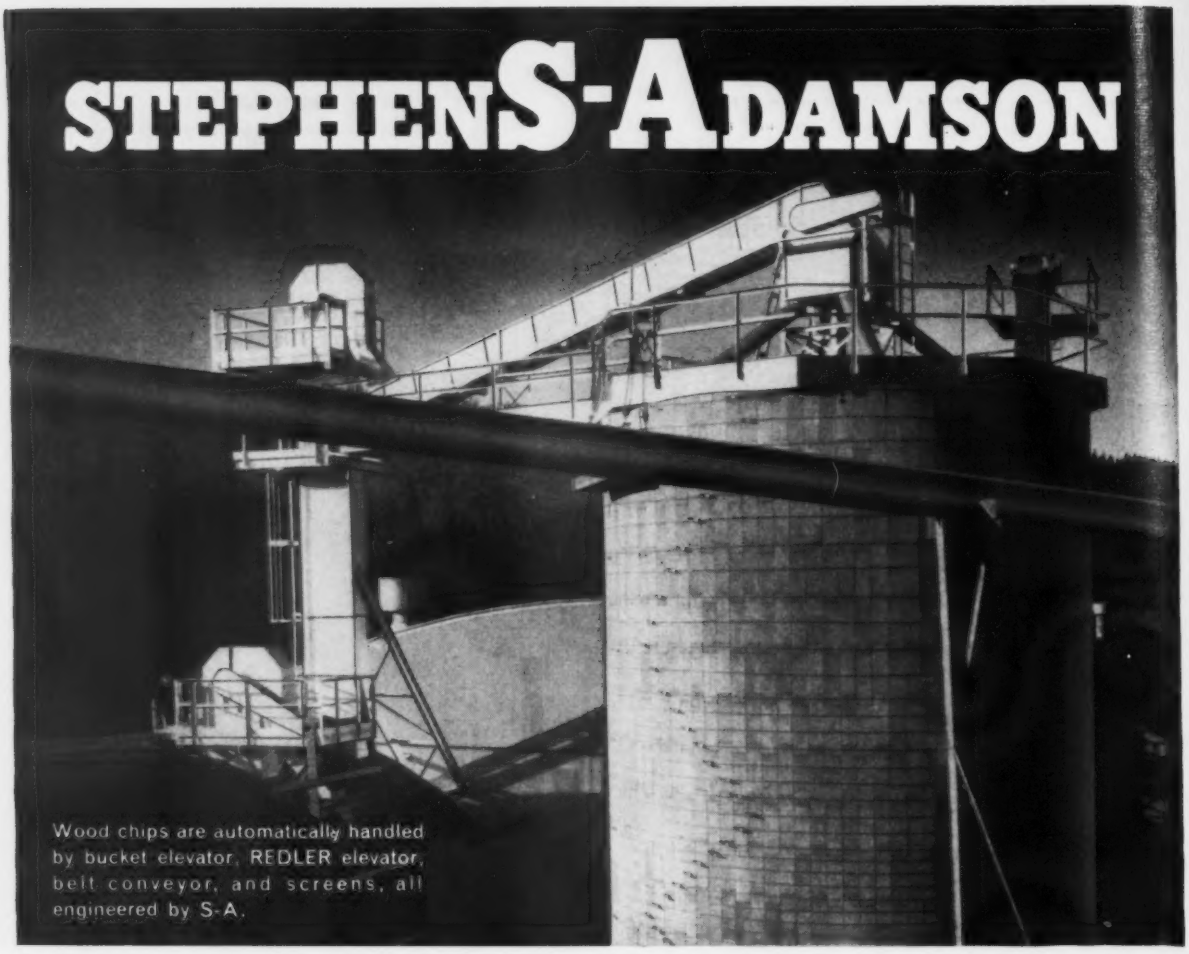


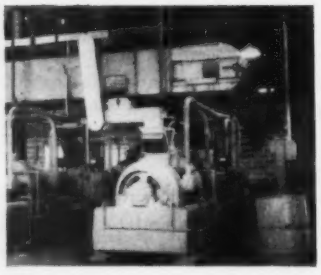
Wood chips are automatically handled by bucket elevator, REDLER elevator, belt conveyor, and screens, all engineered by S-A.

conveying systems — by men who know conveying best!

Where dry bulk materials must be conveyed and processed—anywhere in the world—STEPHENS-ADAMSON can supply the equipment to move them better, faster, and at lowest cost per ton. In every industry where bulk materials handling is part of the processing job, S-A engineers have the experiece that accrues from planning thousands of installations.

If you need a single item, or a completely engineered and installed system, STEPHENS-ADAMSON has the exact conveyor machine, or will design the system that will do the job best. Our engineers will work independently or with plant engineers, consulting firms, and construction contractors.

Call on S-A. When you do, you call on 56 years of experience.



Stephens-Adamson's exclusive REDLER conveyor carries wood chips to refiners. REDLER conveyors and elevators are built in many arrangements, will handle any dry bulk, fine, flaky or granular material. Completely enclosed design protects the product.

A western sand and gravel producer (one of the largest in the country with a capacity of 550 TPH) handles aggregate with a conveying system engineered and built by Stephens-Adamson. System includes belt conveyors, screens, crushers, feeders.

S-A manufactures a wide range of material handling products in three complete plants in U. S. and Canada.

- Belt Conveyors
- Belt, Pan & Plate Feeders
- Ship Loading Boom Conveyors
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- "Natural Frequency" Vibrating Conveyors
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- ZIPPER Conveyor-Elevators
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- Headshaft Holdbacks
- Grizzlies & Screens
- Centrifugal Pilers
- Bin Gates & Tunnel Gates
- Car Pullers & Spotters
- Bucket Elevators
- Skip Hoists
- SEALMASTER Ball Bearing Units

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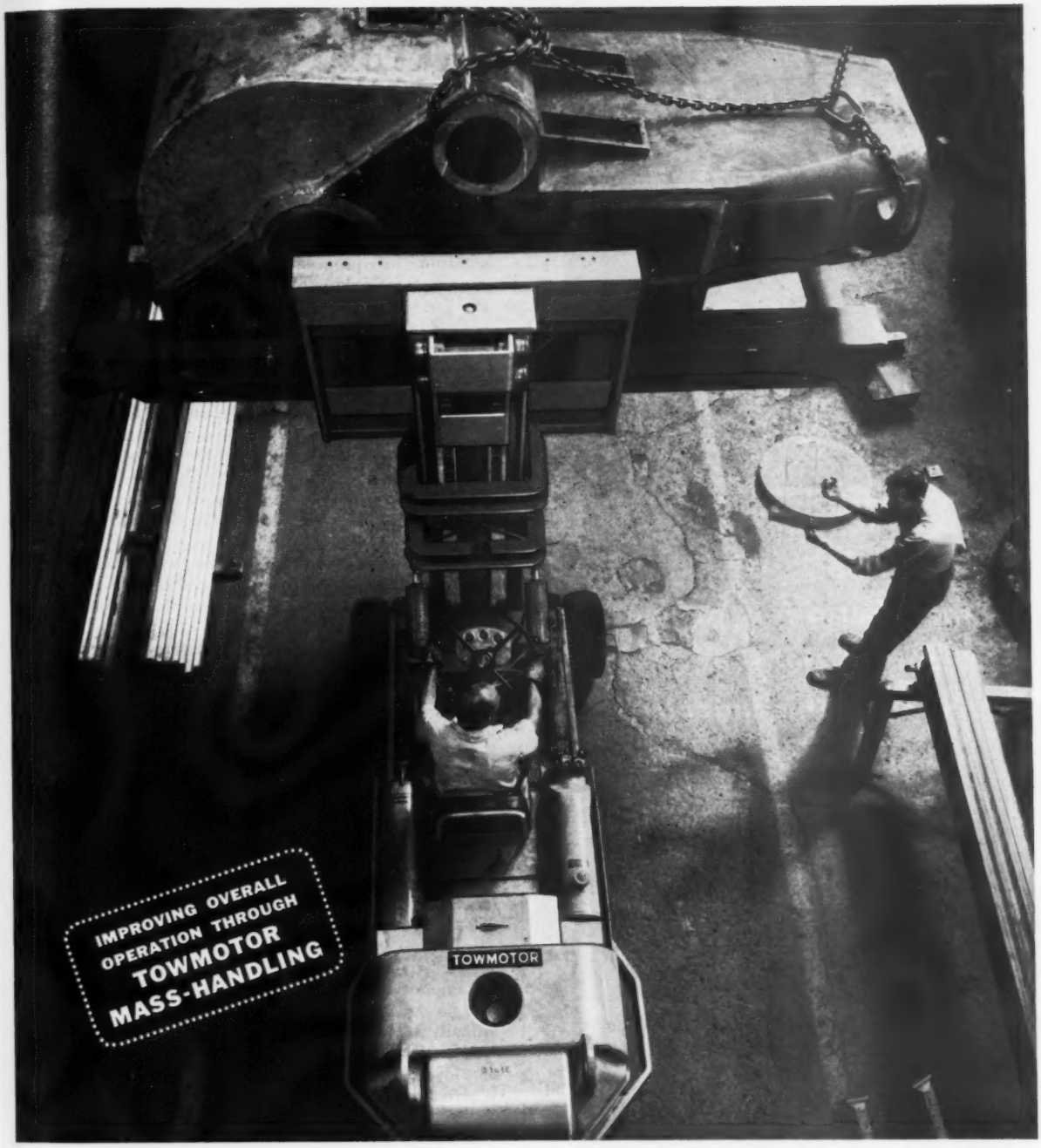

...increasing productivity without adding personnel!

Management men in every industry are giving productivity and profits—*as well as personnel*—a lift by integrating Towmotor mass-handling in all operations from receiving to delivery.

Every department benefits. More work gets done. And you don't need more men to do it because Towmotor fork lift truck operators are finding it's *fun* to multiply the handling of materials aided by 12 new Towmotor improvements like these:

- New functional body styling
- New pace-setting comfort features
- New "tight-spot" maneuverability
- New centralized easy-reach controls
- New positive-response hydraulic lift
- Towmotor-improved power steering

Some of the industry's most significant advances in fork lift truck design and performance are shown in Towmotor's latest bulletin #SP-23. See how they help supplement your personnel—permit your men to do a bigger day's work easier—give each operator the power to improve your plant's productivity and profits.

Write Towmotor Corporation, Cleveland 10, Ohio. We'll send the illustrated booklet immediately.

Leaders for 38 years in building Fork Lift Trucks and Tractors

TOWMOTOR® THE ONE-MAN-GANG — GERLINGER

Gerlinger Carrier Company, Dallas, Oregon is a subsidiary of Towmotor Corporation, Cleveland, Ohio

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it's a gift

costs but a few pennies, but worth its weight in gold. This ingenious shelf support bracket makes

BORROUGHS STEEL SHELVING

the most versatile and most adjustable on the market..it's been a gift in savings to industry.

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LABOR NOTES

. . . continued from page 20

HERE'S THE LATEST IN WESTERN SUGGESTION PLANS—one carrying a top award of $10,000 just being initiated by United States Steel's Columbia-Geneva Div. and Columbia Mining Co. Here is a quick outline of the ambitious new program, designed by the firm to stimulate constructive thinking by all employees, reward them liberally for worthwhile suggestions, and give recognition for individual ingenuity and creativeness.

As defined, a "suggestion" is a proposal of a definite idea which will lead to the establishment of new or improved practices, products or facilities.

General areas in which suggestions will fall include reductions of cost, waste, maintenance, hazards to health, or possibilities of accidents or fire; increases of product utility, quality, yield or production; conservation of materials, energy, power or time; and development of merchandising or sales ideas, new sources of revenue, or new products.

Most suggestions are expected to deal with entirely new concepts, but ideas covering adaptation of existing practices or equipment suitable for different purposes will be acceptable.

Suggestions that involve replacement of facilities, extensions of existing practices or equipment to other areas, policy matters, items which have already been considered and upon which action is pending, and methods and facilities of plants or offices operated by other companies within U. S. Steel properties, will not be accepted.

Awards for adopted suggestions will range from a minimum of $10 on up to $10,000. In exceptional cases, consideration will be given to even higher awards. All awards will be based on management judgment of the value of the adopted suggestion.

For cost-reduction awards, the amount usually will be based on the first year's saving at the plant, mine, or office where adopted. The total saving will be determined by accounting procedures. After the cost of installation is subtracted, 20% of the net saving will be presented to the employee making the suggestion. Adopted suggestions that do not result in cost reductions will be judged individually by management.

If a suggestion is submitted jointly by more than one employee, any award will be divided equally among them. Where duplicate suggestions are received, only the employee first submitting the idea will be eligible for an award payment, unless an agreement to share the award is reached by the workers involved.

Administering the plan will be committees established on the plant, division and corporation levels. The plant-level committees, which will receive and process all suggestions, will consist of three to six members, one of whom is to be the plant patent supervisor. These groups will review suggestions, recommend potentially acceptable ones for approval, and maintain records and files on all suggestions.

All hourly-rated and certain salaried employees are eligible to participate in the plan, except individuals engaged in special assignment work who will not receive awards for suggestions pertaining to such assignments. A leave of absence or separation from employment will not disqualify a worker for an award once a suggestion has been made. In case of death, a subsequent award will be treated as unpaid compensation due the late employee.

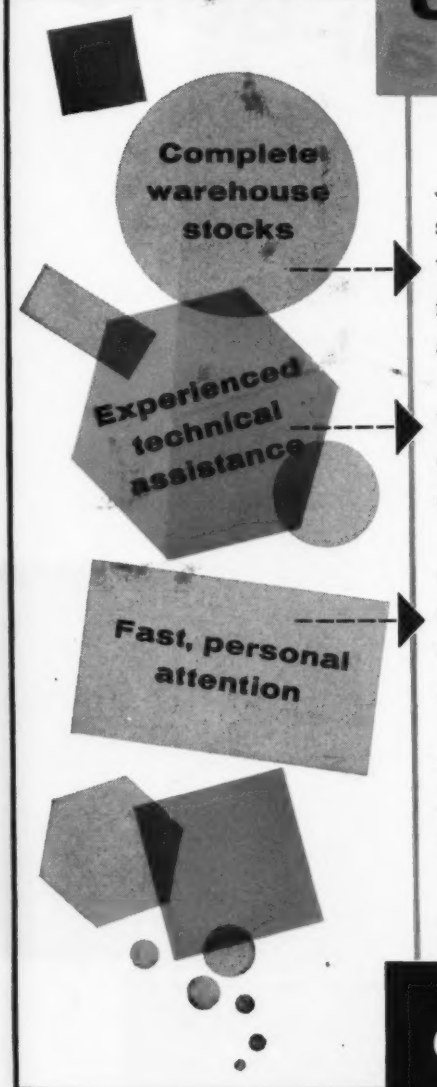
Now... complete stocks, prompt deliveries

of Aluminum rod, bar and wire

from any of the 10 Western warehouses

of

Clingan & Fortier, Inc.



...of rod, bar and wire in all sizes and shapes are only a phone call and a short delivery time away from any Western plant or shop.

You can rely on Clingan & Fortier for fast, courteous Western service... for regular shipments and emergency requirements that simplify your storage and inventory problems.

When you phone our customer service specialists, you talk with trained and qualified men who know the application advantages of aluminum rod, bar and wire in terms of *serving your particular needs best!*

On orders of any size...every time you need aluminum, phone your nearest Clingan & Fortier warehouse FIRST. You'll get the *exact* aluminum rod, bar or wire you need...*when you need it!* We believe our specialized aluminum service will please you and pave the way for *more* calls.

The number of Western plants and shops that have switched to Clingan & Fortier's combination of *specialized service and dependable quality* is growing steadily. Call TODAY!

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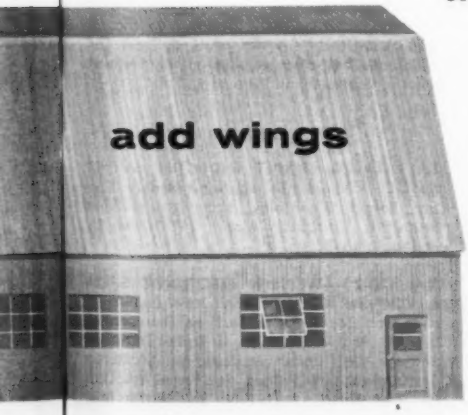
Start your new plant facilities in a low-cost Soulé Building that exactly fits your needs and budget. Then later, when increased business demands expansion of your plant, you'll be money ahead. That's because all-bolted Soulé Buildings expand quickly and economically. Our own erection crews arrive on the job, remove siding, add on new frames and cover the new building. That's all! Clean and quick—with the existing building completely usable during expansion.

Money-saving Soulé Building advantages:

Easy to add length or width — **New buildings erected for use in days**
Parts design standardized for low-cost — **Sizes to fit any need**
Backed by the West's largest metal building manufacturer

Investigate low-cost Soulé Buildings. You'll be pleased at how economically your business can grow with clear-span Soulé Buildings.



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4118

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WESTERN MEETING REPORTS

WHAT TO DO WITH THE LITTLE WOMAN can become a major industrial problem—especially when you're attending a convention.

But there's a solution—as provided by planners of the Western Electronic Show and Convention (WESCON), which meets during the week of August 20 in San Francisco.

While the men are busying themselves with the convention, the women-folk will be doing a lot more than knitting. A whole week of social activities and sight-seeing has been arranged for them by Mrs. Herman W. Smith, Jr., of Woodside, Calif., and Mrs. Edward G. Hall of Menlo Park, Calif.

The first event, on Tuesday, August 20, will be a "Get Acquainted" tea at the San Francisco Museum of Art. Between the hours of 2 and 4 p.m. the social rooms of the museum are expected to be filled with visitors. Wives of men associated with the electronics industry in the area will serve as hostesses. Tours of the galleries are planned.

On Wednesday, August 21, there will be a choice of two events occupying the afternoon hours. Blocks of tickets have been secured for matinees of the film "Around the World in 80 Days" and the Broadway stage production of "No Time for Sergeants."

The alternate choice for Wednesday is a Peninsula tour, starting with a visit to the home of "Sunset Magazine" in Menlo Park, to be followed by luncheon at Allied Arts, a crafts center operated by Peninsula socialites for charity. A tour of Stanford University campus will be scheduled.

A fashion show and luncheon will be featured on Thursday, August 22. High style costumes from the fall collection of Saks will be shown during luncheon in the Gold Room of the Hotel Fairmont. Commentary will be by Paul Speegle, columnist for the San Francisco Call-Bulletin. The style theme will be "East Meets West," extolling the oriental influences adopted for California fashions in current vogue.

A northerly cruise of San Francisco Bay is scheduled for Friday, the final day of the program. A large harbor launch has been engaged to depart from Fisherman's Wharf in the forenoon for a leisurely cruise of islands and landmarks edging the bay.

Voyagers will disembark at a Sausalito pier for luncheon at the Ondine, a new waterfront restaurant. Arts and crafts centers in Sausalito will be visited during the afternoon.

The Women's Activities Committee will also have open throughout the week a Hospitality Room at the Fairmont, WESCON's headquarters hotel on Nob Hill.

There . . . that's one answer to the question, "What to do with the little woman?" . . . at conventions.

TO INTEREST YOUNG PEOPLE in scientific and engineering careers, the Aircraft Electrical Society has installed modern electrical, electronic and radio equipment in a 20-ft. mobile trailer for use in public schools, youth and Boy Scout camps throughout Southern California.

The trailer will be exhibited at the Aircraft Electrical Society's 14th annual display of aviation electrical equipment, Oct. 24 and 25 in the Pan Pacific Auditorium, Los Angeles.

Equipment to be housed in the trailer includes amateur radio receiving and transmitting equipment, code practice equipment, directional radio compass, geiger counters, blacklight, automatic weather recorders, six-inch telescope with clock drive mechanism, and graphic recorders.

•

PLANS FOR THE 1957 REGIONAL MEETING OF THE WIRE ASSOCIATION, held June 13 and 14 at the Fairmont Hotel, San Francisco, were set by the gentlemen pictured above. These members of the Pacific Coast planning committee are (left to right): **Lloyd W. Albright,** Colorado Fuel and Iron Corp., Oakland; **D. W. Hadsell,** Columbia-Geneva Steel Division, United States Steel Corp., San Francisco; **V. A. Barbata** and **A. B. Kreider,** Bethlehem Pacific Coast Steel Corp., San Francisco; and **John S. Hawley,** E. H. Edwards Co., San Francisco. Barbata was chairman of the planning committee. During the two days of sessions, some 250 delegates heard panel discussions on technological developments within the industry, and toured the rod and wire mill of Columbia-Geneva Steel Division of U. S. Steel Corporation's Pittsburg, Calif., plant. They also were in on the premiere showing of Bethlehem Steel Co.'s latest film, "The Long Pull."

•

WESTERN MEETINGS YOU SHOULD PLAN TO ATTEND

June 18-20—TRIPLE INDUSTRY SUPPLY ASSOC., national meeting, **San Francisco.** Contact Robert C. Fernley, secretary, National Industrial Distributors Assoc., 1900 Arch St., Philadelphia 5, Pa.

Aug. 20-23—WESTERN ELECTRONIC SHOW & CONVENTION, sponsored by San Francisco and Los Angeles Sections representing the 7th Region Institute of Radio Engineers and the West Coast Electronic Manufacturers Association, Cow Palace, **San Francisco.** Contact Don Larson, WESCON, 342 N. La Brea Ave., Los Angeles 36.

Aug. 28-30—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Pacific general meeting, **Yakima, Wash.**

Sept. 10-12—AMERICAN MINING CONGRESS, metal mining and industrial minerals convention, Hotels Utah and Newhouse, **Salt Lake City, Utah.**

Oct. 15-17—38TH PACIFIC COAST MANAGEMENT CONFERENCE, regional conference, Claremont Hotel, **Berkeley, Calif.** Contact Everett Van Every, secretary-manager, Western Management Assoc., 2180 Milvia St., Berkeley, Calif.

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STEEL TUBING

COLD FINISHED BARS

Direct from the largest tube mill in the West means you save time and you get what you specify. Pacific can provide seamless tubes in carbon, alloy and stainless steel, and electric resistance welded tubing in sizes up to 4 inches in diameter. If you require extra-long tubing, Pacific is equipped to cold draw straight lengths up to 58 feet long. Pacific tubes are "quality controlled" at every critical stage of manufacture to insure close tolerance, workability and long service life.

COLD DRAWN BARS

Precision drawn Patco round bars are quickly available in many analyses from 3/16" through 3½". A wide range of chemistries include C-1018, C-1137, C-1117, C-1045 and MCX-1213, plus Ledloy Grades A & B.

PRECISION SHAFTING

Ground, polished and stress relieved in the Pacific mill, constant laboratory inspection during every vital step insures the highest "quality controlled" product... where precision counts. Available through 2 3/16" diameter.

Avail yourself of Pacific Tubes' Engineering Service in solving your metallurgical or application problems.

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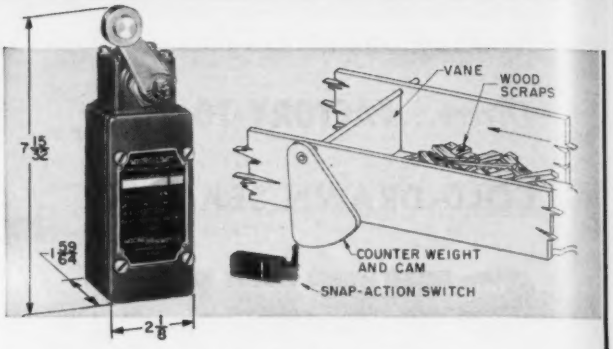
MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

MICRO SWITCH "ML" Switch is control limit to avoid conveyor jams

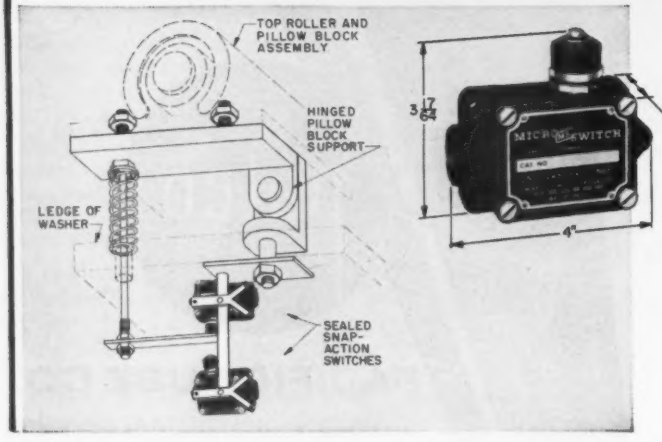
This conveyor system was designed to carry off wood scraps. A vane is constructed in the conveyor line so that material passing down the line presses against the vane in case of a jam-up. The vane is counterweighted by a sector cam made of heavy steel plate. When the lowering of the cam operates the "ML" switch, the conveyor line shuts down. The "ML" switch was selected because it is sealed against weather and permits a 60° overtravel.



MICRO SWITCH "ML" switches combine rugged construction with precise operation. Both single and two-circuit switching units are available. Electrical rating is 20 amperes 120, 240, 480 volts, ac ; ½ ampere 115 volts dc ; ¼ ampere 230 volts dc ; ¾ H.P. 110 volts ac ; 1½ H.P. 220 volts ac.

How to make your production dollar go farther—with

MICRO SWITCH PRECISION SWITCHES



Tension kept within limits by spring lever working between two switches

Fabric tension in a bleaching and dyeing machine is kept from becoming too great or too slack by the use of two MICRO SWITCH "F" switches. The switches are positioned to stop the machine in the event the material passing through the top roller becomes too tight or too loose. Slackening of the cloth brings the lever against the upper switch. Excessive tension releases the springs and the bottom switch is actuated. The Type "F" switches were selected because of their dependability and their sealed protection against moisture and dirt.

MICRO SWITCH "F" switches are long-lived precision switches with the capacity for making and breaking steady state currents of 20 amperes and switching inrush currents as high as 75 amperes.

There are thousands of applications for MICRO SWITCH switches on plant equipment. For additional information on how to use MICRO SWITCH precision switches, let us send you MICRO Tips Digest—a gold mine of profit-making suggestions.

MICRO SWITCH distributors with full stocks of switches for every plant use requirement are located near you. Look under "Switches, Electric" in the Yellow Pages.

MICRO SWITCH
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

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Tension . . . by the ton!

While the air-powered Signode stretcher holds the strapping at its one-ton tension, the workman crimps the seal with a Signode air-powered sealer. The seal, the strap—and the tension—will hold, to keep this 4900-pound bundle of steel bars tight and secure to destination. What material other than steel strapping could do this job, could take and hold this tension, would cost so little, could be applied with air power to do the hard work fast? This hefty bundle is a good example of how—and why—Signode can make your product cost less to handle, store, ship and receive. To be specific, call your Signode man, or write:

SIGNODE STEEL STRAPPING CO.

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. . . for more details, circle No. 24 on Reader Service Postcard

MOTO-TRUC
Low Lift Platform Truck

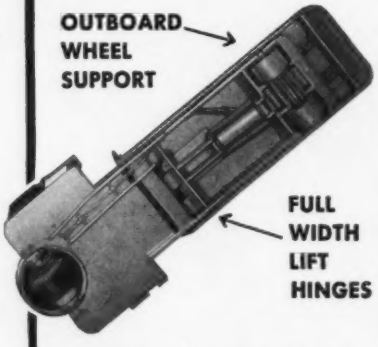
...Simple Construction
...Rugged Performance

You can't beat Moto-Truc low lift platform trucks for skid handling efficiency. They're small enough to maneuver in the tightest spots, yet tough enough for outstanding performance on your roughest handling job.

Simplicity is the key to Moto-Truc performance. The powerful gear drive unit-exclusive internal expanding brakes-patented "Roller Grip" travel control--all are among the features that guarantee lower operating costs, less maintenance and greater dependability.

The standard platform truck, model MTP, is only 24" longer than your load while the extra short model MTP-SC adds only 17" to the load length. Both are built in 4,000, 6,000 and 10,000 pound capacity with a wide range of platform sizes.

A LOOK UNDERNEATH



See how Moto-Truc Platform Trucks use simple construction to insure rugged performance? For example, these two service proven features— Load wheels are supported on both sides to take a pounding from rough floors and heavy loads. Lift hinges run all the way across the platform for maximum load support and reduced maintenance.

Write Today For Bulletin 56W. Get detailed specifications on all Moto-Truc's low lift platform trucks.

Builders Of The First Walkie Truck

The MOTO-TRUC Co.

Representatives in Principal Cities

1963 E. 59th St. Cleveland 3, Ohio

Pallet... Platform... Hi-Lift Truck

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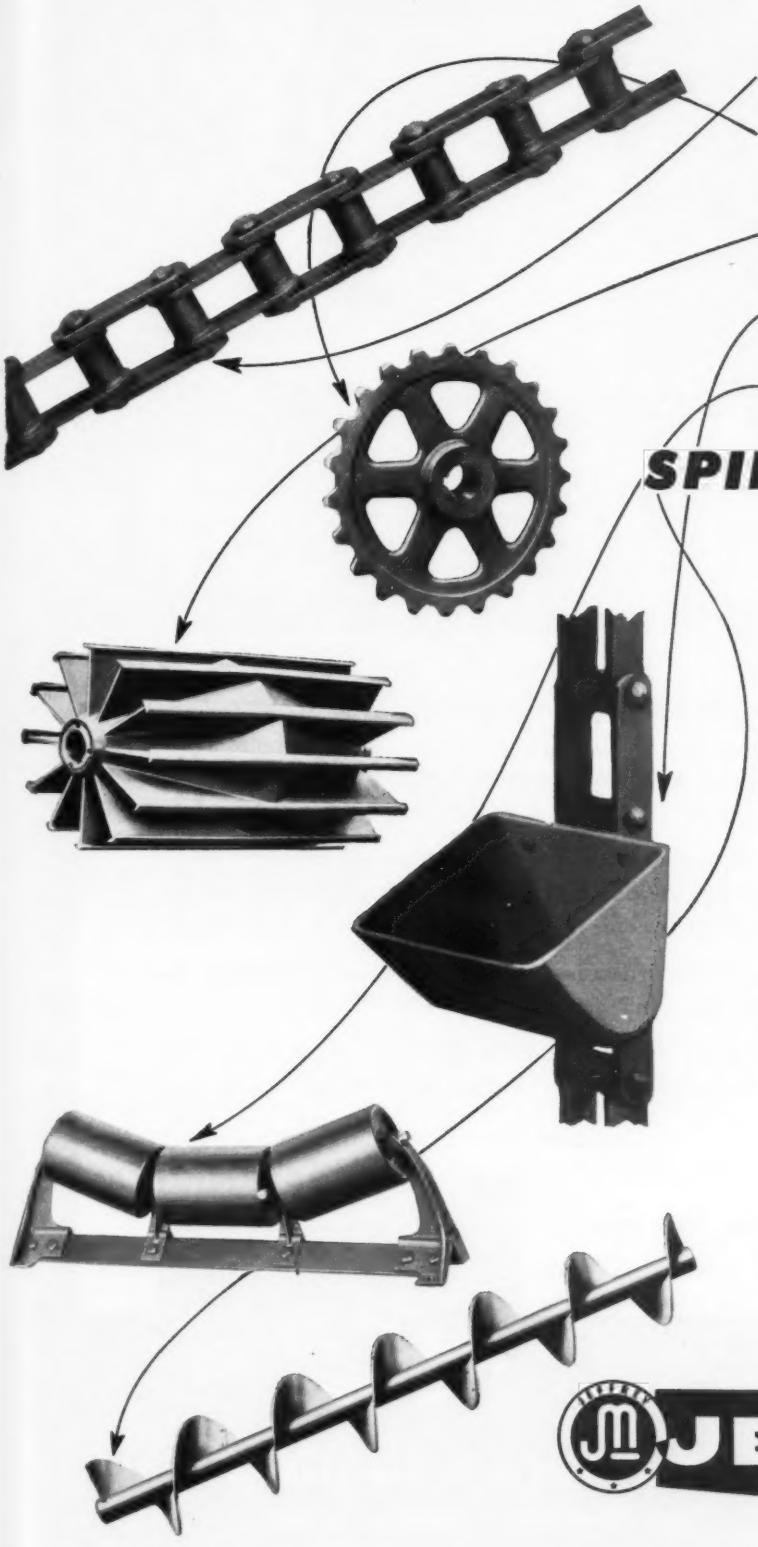
Specify **JEFFREY** when you replace



CHAINS
SPROCKETS
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IDLERS
SPIRAL FLIGHTS

YOUR Jeffrey distributor can supply the units you need for replacing worn parts and modernizing old equipment. Your materials-handling and power-transmission machinery will give more efficient, economical operation when you use these time-tested, dependable products.

Jeffrey replacement parts have the same sound design as those used on original equipment. All are designed for maximum service. Materials and workmanship are the finest. Jeffrey District Offices and Distributors are located in all principal cities. The Jeffrey Manufacturing Co., Columbus 16, Ohio.

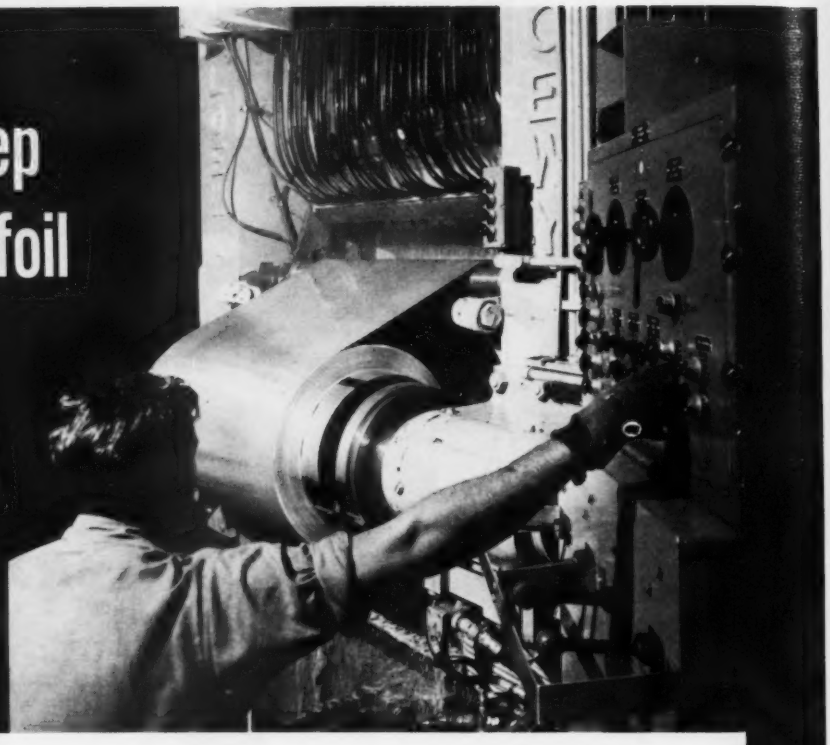
JEFFREY

BURLINGAME, CALIFORNIA . . . 1862 ROLLINS ROAD . . . TELEPHONE OXFORD 7-5303

. . . for more details, circle No. 26 on Reader Service Postcard

how to keep aluminum foil from shattering

... at 35 miles per hour!



Kaiser Aluminum & Chemical Corp. increased annual production of aluminum foil 50% at its Permanente, California plant through installation of a four high foil mill. This mill reduces aluminum strip in thickness from .026 to .00025 of an inch at speeds up to 3000 fpm.

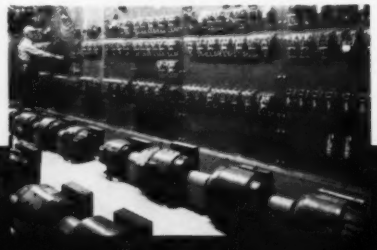
At 35 miles per hour, excessive strain at any of the several reduction stages would shatter the extremely thin foil. From the original payoff reel through to the final rewind, uniform tension is provided by Reliance V★S Drives.

Reliance engineers built this drive specifically for this mill, to provide the constant uniform tension which is so important.

This application is typical of the many diversified jobs that Reliance V★S Drives are called upon to perform. There is a Reliance V★S Drive to fit your application.

D-1662

For further details, write Dept. 326A, or call!



Main control room—Where Reliance equipment provides more than 2,900 hp. to drive this mill.

RELIANCE ELECTRIC AND ENGINEERING CO.

1525 ADRIAN ROAD • BURLINGAME, CALIFORNIA

General Offices: Cleveland 17, Ohio • Canadian Division: Welland, Ontario

... for more details, circle No. 27 on Reader Service Postcard

Santa Cruz Veneer Products Co. uses 18 and 19-gauge USS Stapling Wire for stitching bushel baskets (large picture). At peak production, they turn out some 15,000 of these fresh pea shipping containers a day. In the bottom photograph, 16-gauge USS Wire is being attached to basket covers to act as loop fasteners. Wire for these jobs must be produced to exact specifications. If the quality varies even slightly, these machines will know the difference.

USS Wire gives the perfect combination

In one quick operation, Santa Cruz Veneer's bushel basket machines cut wire to length, form it to staple shape, then drive and clinch the wire into veneer. This stapling wire must be just soft enough to bend without breaking . . . just hard enough to drive without bending. For 35 years, United States Steel has been delivering wire with that perfect combination!

USS Metallurgists will help you combine your working requirements in a USS Wire that's just right for your job . . . then demonstrate its superior qualities with a working sample. From that time on, you can depend on every coil, every shipment to be the same as that first perfect working sample. The result is bound to be smoother running machinery, fewer rejects and a finer finished product . . . with USS Manufacturers Wire.

Free Wire Gauge! WI 6-57

UNITED STATES STEEL CORPORATION
COLUMBIA-GENEVA STEEL DIVISION
120 MONTGOMERY STREET
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Please send me your free wire gauge that's fast and simple to use for accurate measurements.

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*Company*_____ *Title*_____

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USS

USS Manufacturers Wire

UNITED STATES STEEL

. . . for more details, circle No. 88 on Reader Service Postcard

Another **STANLEY STEEL STRAPPLICATION*** on the job

Would you like to triple packaging output, too?

The Bilco Company, New Haven, Conn., manufacturer of "America's finest basement door" credits The Stanley Steel Strapping System with "tripling packaging output, reducing product damage to a minimum, and completely eliminating pilferage." These benefits stem from the Stanley Steel Strapping Specialist's recommendation that Bilco wrap door parts and equipment in corrugated board, reinforced with the strength of Stanley Steel Strapping. For maximum packaging speed and mobility, a Stanley Electric Skid Magazine Tool installed on an overhead mount is used to power-tighten the strapping to a pre-set, uniform tension.

Your packaging requirements may be similar to Bilco's – or quite different. In either case, the Stanley Steel Strapping Specialist's recommendations can save you time and money, too. He'll prove this with a personal demonstration. **WRITE FOR YOUR FREE COPY** of the "Stanley Strapplication Manual of Packaging and Shipping" to **STANLEY STEEL STRAPPING,** Division of The Stanley Works, Dept. F, 1216 Lake Street, New Britain, Conn.

**The system-atic way to solve specific packaging and shipping problems*

INSURE IT–SECURE IT WITH STANLEY STEEL STRAPPING

AMERICA BUILDS BETTER AND LIVES BETTER WITH STANLEY

STANLEY

This famous trademark distinguishes over 20,000 quality products of The Stanley Works—hand and electric tools • drapery, industrial and builders hardware • door controls • aluminum windows • metal parts • coatings • steel and steel strapping—made in 24 Stanley plants in the United States, Canada, England and Germany

. . . for more details, circle No. 29 on Reader Service Postcard

YESTERDAY: Rivets
TODAY: High Strength Bolts

TOMORROW? More high strength bolts —for that is the new way of erecting steel structures.

Less and less will there be the raucous rat-a-tat-tat of riveting, jangling the ears and nerves of the community. In its place, the faster, quieter, better technique of bolting.

What has helped make this better way of multi-story construction possible? RB&W high tensile bolts. These bolts make stronger connections than rivets. They can withstand tremendous stresses, can tie a towering steel structure together in less time than rivets . . . at less overall cost.

RB&W—A MAJOR SUPPLIER TO ALL INDUSTRY

A leader in its field for over 112 years, RB&W turns out the finest fasteners for virtually *every* major industry. It is the *largest independent producer* of high strength bolts for construction.

Modern facilities, new techniques, long experience . . . all combine to make RB&W fasteners truly the "strong point of any assembly."

CONTACT THE RB&W "FASTENER MAN"

Standard fasteners properly applied can be a cost saver. Put it up to the RB&W "Fastener Man" to show you. Contact your nearest RB&W office.

112th year

R B & W

"SERVING THE WEST FROM THE WEST"

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Plants at: Los Angeles, Calif.; Rock Falls, Ill.; Coraopolis, Pa.; Port Chester, N. Y. **Additional sales offices at:** San Francisco; Dallas; Detroit; Chicago; Pittsburgh; Ardmore (Phila.), Pa. **Sales agents at** Denver; Milwaukee; New Orleans. **Distributors** from coast to coast.

RB&W FASTENERS - *Strong Point of any assembly*

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Cuts 24" beams in 12 seconds!

When this big friction saw cuts cold steel like hot butter it also completes one more step in the quality control of Ryerson steel.

A new method of blade alignment and an automatic gauge of our own design assure a remarkably straight, true cut—and frequent blade changes result in minimum burr!

This kind of control is typical of the exacting attention we give to every operation. As a result, we achieve far greater accuracy than called for in standard tolerance tables—almost without exception.

Certified cutting of Ryerson steel and the over-all control of Ryerson steel quality are important points to remember when you're specifying or buying steel from stock.

RYERSON STEEL

In stock: Carbon, alloy & stainless steel—bars, structurals, plates, sheets, tubing, industrial plastics, machinery, etc.

JOSEPH T. RYERSON & SON, INC., LOS ANGELES—Plant: 4310 E. Bandini Blvd. Mail: Box 3817, Los Angeles 54. Phones: ANgelus 2-6141, from San Diego (no toll) Zenith 6660. SAN FRANCISCO—Plant: 65th & Hollis Sts., Emeryville. Mail: Box 188, Emeryville, California. Phones: Olympic 3-2933, Douglas 2-4211. SEATTLE—Plant: 1200 4th Ave., South. Mail: Box 3525, Seattle 24. Phone: Seneca 2300. SPOKANE—Plant: North 207 Freya St. Mail: Box 2158. Spokane 10. Phone Keystone 5-1581.

. . . for more details, circle No. 31 on Reader Service Postcard

JUNE 1957 — 4th ANNUAL PLANT MAINTENANCE & ENGINEERING ISSUE

Western Industry

SHOULD YOU USE INCENTIVES

$ $

FOR YOUR MAINTENANCE MEN?

? ?

The West lags in both application and knowledge of incentive plans for maintenance craftsmen. Special Western Industry survey tells the story.

WESTERN INDUSTRY editors during the past three months have visited, telephoned and corresponded with plant engineers and maintenance superintendents in sixty typical Western plants, asking the question, "*Are you using financial incentives for the men doing your maintenance work?*" The answers: 2 yes, 58 no.

To the 58 who said "no," we asked a second question: "*Do you have any plans for initiating a maintenance incentive program and, if so, what steps are you taking toward that eventuality?*" Here, only seven reported either active (or even passive) "investigation" of maintenance incentives, with but two of the seven stating that they were doing the preliminary work required in order to set up a satisfactory program.

Still a frontier in the West

The ratio of answers to the first question was not surprising, even though it indicated *Western use of maintenance incentive is far less than the 26% or more of Eastern plants who have adopted some form of incentive program in this phase of plant operation.* Why? For one thing, the typical Western plant is newer than its Eastern counterpart. Therefore, the need for close attention to maintenance of aging equipment and facilities is not yet being felt keenly here (see "Views and Comment," page 11). For another, the West is the "land of small plants" . . . and the typical small plant here (100 employees or less) is not yet working with *any* sort of systematized maintenance program.

What are the values?

Would it be wise for the Western plant to investigate the values of maintenance incentives? The answer, in full view of many special factors here, appears to be a strong "yes." Listen for a moment to what Charles A. Bogenrief, Industrial and Plant Engineering Department Head at Robertshaw-Fulton Controls Div. of Grayson Controls in Long Beach, had to say in response to our questionnaire:

Bogenrief: "*With technological advances taking place daily in industry and automation of operations and entire processes a reality, we must look more closely than ever at the utilization of labor.*

"In the past, we were concerned with the measurement of the direct labor force employees simply because they made up 70%, 80% or even 90% of the work force. Indirect labor measurement was generally confined to isolated companies. The same can be said for the application of indirect wage incentives.

"This certainly is not the case today. Many of us have seen our so-called 'direct labor' force shrink in numbers and be replaced with skilled mechanics, production process technicians, and other similar groups called indirect labor."

Westerners typically uninformed

Would it be wise for the Western plant to set up a maintenance incentive program? The answer to this question is "maybe." It is the purpose of this news report to tell you enough about them so that you can perhaps determine on which side of the "maybe" you should be, to outline briefly the steps that should be taken toward initiating a program, and to indicate sources from which you can obtain best current information.

In the application of maintenance incentives, Western plants can draw

heavily upon the trials and experiences of their Eastern brothers. To illustrate the cautious (we almost said "backward"; we should have said "uninformed") attitude of Western plants toward maintenance incentives, consider this case:

At a recent Eastern plant maintenance conference, a conferee described his plant's program: "We are in the chemical industry, and we have had all electricians, pipefitters, millwrights, tinsmiths—everyone, in fact—on incentives for several years. We take average values from time studies—so much time to make up a 2-in. flange or a 2-in. screw connection. The millwrights get so much for taking off a ¾-in. nut. These values are accumulated over the years, and as time goes on they are changed to the benefit of everybody concerned.

"We have about 6,000 people in our plant and about 1,100 in maintenance. Three people are engaged in applying the system in the field, and about ten men are kept busy revising old standards and setting standards for new work. The incentive pay averages about 23 cents an hour, and we think the plan cuts maintenance costs."

Examples of caution

Contrast this progress with that made by the two largest chemical companies based in the West—reported here by the plant engineer for No. 1 and the maintenance superintendent for No. 2, in response to our questionnaire:

Western Chemical Plant No. 1 (with employment of nearly 2,000) "We do not use incentives for maintenance. The setting up of such a procedure would be extremely complex in a chemical plant, since our maintenance work is almost all non-repetitive."

Western Chemical Plant No. 2: "We do not use incentives and have not considered them in the past. Company-wide, we are just beginning to make studies along these lines."

From the conference mentioned earlier, here is another account of a maintenance incentive program—and the salient results it has brought about in efficiency increase:

"Four years ago, my company (rubber goods) investigated the possibilities of incentives for maintenance workers with a view to bringing their earnings up to those of the production workers. We found, for example, that in the first week there were 400 light bulb changes and this took 55 hours; the next week there were about 200 changes, and it took 30 hours. Over a long period, it averaged to 0.13 hours to change a light bulb.

"Then, we did the same thing with pumps within a certain classification; there, it was more complicated, but we found that we could get an average. We also found that there is a great deal of repetitive work on the larger jobs.

"We set maintenance standards at 80%, and shared everything above that on an incentive basis. Efficiency has gone up about 20%. We have 234 maintenance employees, and one man took care of the accumulation of the data."

How one program halved costs

And another successful program reported in "Plant Engineering" magazine, June 1956: "We initiated a system of financial incentives for maintenance just a few years ago that has paid appreciable dividends in the reduction of down-time, improvement of work quality, and increased productivity. The fact that maintenance costs (labor, material and overhead) per one thousand production units over a five-year period from 1951 to 1955 dropped steadily from $30.837 to $18.665 evidences how well this arrangement has been working.

"This, briefly, is how our program works: A curve is used to establish the number of man-hours that are to be used in calculating the premium earnings of each maintenance employee over a working week. This allowance covers the general maintenance and inspection activities pertaining to plant and equipment. The vertical scale on the chart reads in allowable man-hours, and the horizontal one represents the total number of acceptable production units in a week's time.

"If satisfactory execution of the required maintenance work and inspection consumes less time than has been allowed, the maintenance depart-

To initiate maintenance incentives . . .

Here's what you need:

1. *A work standard* established through time study and standard data and expressed in a manner easily understood by the employee.
2. *A reward* closely related to the worker's own effort and skill for better than standard performance.
3. *A clearly defined method* through which the worker may reach and surpass the standard.
4. *Premium earnings* large enough to encourage high performance.
5. *Clearly understood conditions* under which the standard may be changed.
6. *A plan that permits* the average employee to calculate his own earnings.
7. *A plan that is easily stretched* to encompass an unusual condition and provide a temporary standard.

Here's how to set it up:

1. *Time study the operation* for several complete days. Record all the work elements and time them in the smallest time increments practicable—to the hundredth of a minute.
2. *Post time study data* to comparison sheets and analyze the data.
3. *Review present methods with foremen* and suggest better methods (they will be obvious at this point).
4. *Revise the methods,* train employees in new methods, and add new equipment where necessary.
5. *Time study the new methods* and add time data to the comparison chart.
6. *Determine the elements* that comprise the work cycle.
7. *Combine all the elements* that have a constant time value into a single constant time element.
8. *Analyze variable time values* through graphs.
9. *Prepare tables of time values* for each element of work involved in the operation.
10. *Prepare simple instruction sheets* for the operators. Also develop and install the simplest timekeeping and payroll procedure that will give correct results.

. . . Abstracted from an article in "Mill & Factory" Magazine, January 1956

"Measurement and control must come first"

AUTHOR

R. H. EDGECUMBE

Chief Industrial Engineer, Virtue Bros. Mfg. Co., Los Angeles

FOR A SUCCESSFUL incentive program, much preliminary work must have taken place. *Do not enter into an incentive payment plan until you have devised a sound basis for work measurement and control.*

Work measurement is a measure in terms of time of the work content of a given task. This measure should represent an application of normal skill and effort in consideration of the conditions under which the work is performed; it should include compensation for the personal needs, safety, and the effects of fatigue upon the worker.

Standardize . . . then plan

The establishment of a reasonably accurate measure is directly contingent upon the degree of *standardization* to which the work has been subjected. This is the result of a painstaking analysis of the method, including: the tools, equipment and the materials used, and the motion pattern that can best be used by the worker to perform the work.

Assuming that you have standardized the manner in which the work is to be performed, this is still not enough to provide the necessary daily or weekly measure of control. The missing ingredient is *planning*. Job planning and work scheduling are essential to the effective utilization of labor. Work measurement is only as adequate as the degree of work planning and work standardization that has been applied to the work. Conversely, the degree of effectiveness in planning and scheduling depends upon reasonably accurate work measurement.

Work measurement methods

Methods currently being used for work measurement and control include *estimating* (usually, foreman of craft involved determines scope of work, estimates time required for performance. and records work plan); *historical records* (accumulation of data from completed work orders); *standard time data* (each job is subjected to a time study, and sub-divided into work elements); and *work sampling* (observations of the work at random intervals frequently enough to provide statistically valid samples.) Each of these methods has its advantages and disadvantages. Each one of the approaches can probably be justified on the basis of a recognition of each plant's particular problems. The method of measurement used should depend entirely upon the degree of control desired.

A "combination" approach

An interesting "middle of the road" approach for setting up a sound measurement and control plan, in advance of an incentive system, can be outlined as follows:

1. Institute a work order system complete with standardized work descriptions, codes, sketches, etc.
2. For a sufficient period of time, the industrial engineering department should classify and record the information on completed work orders in a manner similar to the *historical data* method.
3. Concurrently the industrial engineering department should set up a work sampling plan similar to the *work sampling* method, to obtain samples of the performance rates of each craft.
4. The industrial engineering department should also become familiar with all of the work performed by all the crafts, and should write up detailed operating procedures for representative work within each craft.
5. After adequate historical data have been accumulated and analyzed, the plan similar to the *historical data* method should be instituted.
6. The industrial engineering department should study and develop proper work methods for all *significant* maintenance jobs, and should develop standard data where necessary and simplified formulas for rapid application. (It may prove surprising to find how many jobs there are that can be subjected to this approach.)
7. The resulting standard data should be integrated into the plan as they are developed.
8. Occasional audits, by work sampling, should be made to assure the validity of the control.

This approach makes the most effective use of the various measurement techniques available. The work order system is the initial *planning* step; analysis and classification of the jobs from work orders is the initial step in *standardization*.

This is then followed up by more intensified methods work. Overall control, the prelude to a successful incentive plan, then takes shape and gains stability.

. . . Abstract of an address before the 3rd Western Plant Maintenance & Engineering Conference June 1957.

ment receives credit for the difference. Should there be an excess of time expended, the department is debited in units equivalent to the hours and portions thereof over the allowed time."

The preceding three examples from maintenance-wise Eastern plants exemplify the atmosphere of enlightenment that exists for maintenance incentives east of the Rockies. Again, let's contrast that with the thinking of some typical Western firms, your neighbors. Here are five additional samplings of comments on our questionnaires (note the standard objections that are refrained; they'll be mentioned later:)

1. Western mining company (Chief Engineer): The application of incentives for maintenance is not now the practice here. This is, I suppose, because the idea never occurred to us."

2. Western aircraft manufacturer (Maintenance Superintendent): "We do not use incentives for maintenance, other than the usual ones of rewarding exceptionally competent workers with more rapid promotion and of paying for suggestions. The reason for not using them is because it apparently has never been thought of. Our maintenance department is not familiar with how such a program would work."

3. Western small tool manufacturer (Plant Engineer): "We do not have a wage incentive plan because, in our opinion, it would not be economically feasible. Only a very small part of our maintenance jobs are repetitive. Varying conditions of like equipment, equipment location, type of work performed by such equipment and other dissimilar factors would prohibit setting up standards of measurement that would be sufficiently accurate even for average conditions.

"We do believe a group incentive plan for the entire department could possibly be made to work in a satis-

. . . concluded on page 45

A SIGNIFICANT Western Industry INTERVIEW . . . . WITH ROBERT L. FRIEDENTHAL*:

"There is no excuse today for dirty plants. They waste too many labor dollars."

Q. Mr. Friedenthal, in the past few years have you noticed any significant trends in industrial housecleaning in Western plants?

A. Yes, there have been a number of trends, particularly since and during World War II.

Q. Why do you specify since World War II?

A. For a number of reasons, one being that not too much attention was paid to plant sanitation prior to that time.

Q. You mean plants were dirty?

A. Yes, truthfully, according to today's sanitation standards, some of them were dirty.

Q. Would you elaborate?

A. During World War II, we suddenly found a need for better means and methods of sanitation, not only for the Armed Forces, but also because of heavy industrial development here to back up the war effort. For example, absenteeism was a tremendous problem during the war. This headache was eliminated in part by making the plant a more attractive place and, through better sanitation, absenteeism was reduced.

Q. Have any of the discoveries made during the war affected plant housekeeping products available today?

A. Yes . . . particularly in disinfectants. Prior to the war, the most popular disinfectants were sheep dip and pine oil. Today there have been developed several which, in our opinion, are far superior.

Q. How has this trend affected the cost of housekeeping?

A. Although the cost of many materials has kept pace with our economy through the use of better techniques and mechanization, labor costs have been reduced considerably.

Q. Is labor the major factor in the cost of plant maintenance?

A. Yes. Labor costs will run a minimum of 90% of the total cost of maintenance.

Q. Has there been any continued research since the war?

A. Yes. The changes which we have seen thus far are tremendous, but only an inkling of what is to come. I cite as an example, the changes in the wax field where the resinous type finishes have taken over a good percentage of floor finish business.

Q. How does the consumer gain from this?

A. For one thing, it has eliminated the slip hazard to a great extent. The wearing qualities in many cases have been outstanding.

However, personally, I don't feel that the ideal floor finish has as yet hit the market and I think you will find in the next decade tremendous improvements over what we can offer today. This is all the more reason why we must continue our research and continue to strive for better products for maintenance.

Q. Going back to your statement that 90% of the cost was in labor—do you feel that there have been

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* *BOB FRIEDENTHAL is the best qualified Westerner we could think of to provide facts on the latest trends and ideas in Western industrial plant housekeeping. A native of Southern California, he is now General Manager for the Northern California Division of Easterday Supply Co., the West's (and one of the world's) biggest supplier of products for industrial sanitation and maintenance. He has been with Easterday since his discharge from the Air Force after World War II. Going directly from the U.S.C. campus to war, he was discharged with the rank of major. At war's end, he went first to the Northwest, where for five years he was manager of Easterday's Portland office. For the past seven years he has been located in San Francisco.*—Ed.

"Management is insisting that its custodial staffs be better trained on how to do the job for which they were hired."

"Several new plant housekeeping products far superior to their predecessors were developed during and after World War II... particularly in disinfectants and floor finishes. But this is just an inkling on what's to come..."

"Labor represents a minimum of 90% of total maintenance costs. That's why mechanization of housekeeping jobs is so important today. Examples? There are tremendous possibilities for new machines that both scrub and vacuum in one operation. Simply using a wider sweeping machine can chop labor costs by 75%."

any significant changes in our application of labor to housekeeping?

A. Yes. I feel that management has become quite cognizant of this problem and is insisting that its custodial staffs be better trained and better informed on how to do the job for which they were hired.

Q. In addition to better training programs, have there been any other significant factors to reduce this astounding 90% labor costs?

A. Definitely. As an example . . . I will cite a development in our own sales that will point this out more clearly. Ten years ago, about 80% of the floor machines sold were of 14-in. diameter. Today, we don't even stock anything smaller than a 15-in. and the bulk of our sales is over 19 in.

To illustrate this further I would like to state the following figures: in areas that can be done in 60 minutes with a 12-in. floor machine, the same area can be done in 34 minutes with a 16-in. machine, or approximately 50% labor savings. The same area is done in 15 minutes with a 24-in. machine or approximately 75% labor saving.

Q. Has any other phase of plant housekeeping been mechanized?

A. Yes, there have been several further developments. The automatic scrubber, a machine which scrubs and vacuums in one operation, has come into more general use, and developments in this type of machine will be tremendous in the next few years.

There is one in particular which will be on the market in the very near future which will not only go forward but backwards as well. And this, of course, will be advantageous. The cost of this equipment for the average plant is now prohibitive; however, production line facilities will be used in the near future and this will greatly reduce these costs.

Q. Since plant maintenance seems to be getting more technical, does it take men with special knowledge to handle such a program in the average plant, or can it be done by the ordinary janitor?

A. The obstacles to learning are not great. A person who will have an open mind can now be taught in a very short time the new methods and technological changes that have come about.

Q. Where is the average plant going to find a teacher, Mr. Friedenthal?

A. Suppliers of housekeeping products and contract maintenance firms are probably best qualified to do that job, and, in fact, *must* do so in my opinion. We, for example, are very proud of the lead we have taken in our industry in holding schools strictly for the custodian.

Q. Are such schools expensive?

A. In the case of the schools which we hold . . . they are expensive to us, but we do not charge for the courses which we offer. We feel that as one of the largest supply houses of its type in the world we must lead the way to develop a sounder approach to plant maintenance and this is the method we have chosen to do it.

Q. Can any of your customers, or readers of this article perhaps, take advantage of these schools?

A. For the most part, yes. In addition to Northern California, these schools are available out of our Portland, Oregon, headquarters and also our Southern California headquarters. As our operation expands we will be able to give even better coverage than we can today.

Q. This sounds like an extremely valuable service. How many schools, for example, have you held to this date?

A. I don't know exactly. However, in the past year and

"This is a mock ceremony where I am presenting 'Doctor of Janitorial Knowledge' diplomas to two janitors graduating from one of our training schools. There are some good reasons why management and purchasing men should attend these schools too."

a half I would estimate we have held 150 schools and have spoken to close to 4,000 custodians.

Q. How large a plant must you have to get this training?

A. Of course it is not practical to hold a custodial school where a plant employs only one custodian. However, in this case we have made arrangements when we are holding schools in nearby locations to invite custodians from the smaller plants to attend.

Q. What about the plant that may need only a part time janitor?

A. Well, I think in a case like this that the plant would be better off to consider contracting its janitorial work. The contract cleaning business has made many advances and the larger and more reputable firms are in a position today to do an outstanding job for a very reasonable fee.

Q. Would that also apply to a medium sized plant that would not want to invest in a lot of expensive equipment?

A. Contract cleaning has many advantages. One is that they are able to supply the supervision which a smaller plant cannot afford to supply themselves.

Q. Getting back to the plant that maintains its own maintenance crews . . . how does this department fit into the management picture in the average plant?

A. Unfortunately, management from the top on down has not had the time to really look into their maintenance problems because of many other duties and the work load in connection with production. Maintenance supplies have been nothing more than a nuisance value to the purchasing department. This, we feel, could be improved to a great extent by more correlation between management and the custodial staff and we have, in all cases where we have held custodial schools, urged both management and purchasing to attend too, so that they would become cognizant of the perplexities of a maintenance program.

Q. At this point I would like to pass on to you some specific questions that our readers have submitted recently. For example, one reader says that he has numerous urinals and toilets in his plant with a yellow stain around the rim. Can he get rid of this and prevent it from reforming?

A. Yes. These stains to which you are referring are uric acid encrustations. They form not only around the rims of toilets and urinals, but also in the pipes, gradually closing the diameter of the pipes and traps until they are of little use. They are not only unsightly, but are the source for the germination of bacteria and the cause of a most unpleasant odor.

There are materials available which are strong enough to eliminate these encrustations and, when used on a proper maintenance schedule, prevent reformation. The method of application is not unpleasant and there is no need for the user to have to touch the toilet or urinal itself. The material is harmless to the skin and to the vitreous china fixture. We suggest using a bowl reconditioner that contains an iodine disinfectant. This will further protect the user.

Q. Another reader says: "Our employees must wash their hands often in order to do a more efficient job on the production line. When they leave to go to the washroom for this purpose, our labor costs skyrocket." Is there a solution to this problem?

A. There are excellent liquid waterless hand cleaners available which can be placed close to the production line along with a towel dispenser and receptacle. These cleaners are dispensed by use of polyethelene containers with a metering nozzle in order to eliminate waste. By placing these in strategic locations in the plant, many hours of labor costs will be saved.

Q. "In cleaning our floors we must use hot water with our cleaner. This is most inconvenient," reports a third reader. Are there products that eliminate this problem?

A. The use of hot water with a floor cleaner is generally most inconvenient and of little value. The temperature of the floor is usually around 68 to 70 deg. and the minute a hot water cleaning solution hits the floor it immediately is cold anyway. There are products available today that are "*temperature engineered*" so that they will work with equal efficiency in hot or cold water.

Q. A maintenance superintendent says that dust is a terrific problem in his plant, and yet when he uses sweeping compounds, he finds it of little help.

A. This is generally true. The use of sweeping compounds is definitely not the answer for dust control. When you use a push broom you merely move the dust from one area to another, and in most cases the agitation of sweeping raises the dust into the air. The use of a dustless mop with 8-in. strands properly treated with the right material will eliminate this problem.

Q. A janitorial chief reports that in waxing he's been told time and time again that his floors must be thoroughly rinsed. Is there any method of doing this without the back breaking mopping operation?

A. Yes . . . by the use of the wet pickup vacuum. The job will be accomplished and will leave the floor in a much better condition than with the use of a mop.

Q. A plant we visited recently had no windows in its restrooms, and the odors emanating from these areas permeated the entire plant. Is there any way of eliminating these odors?

A. In answering the first of these specific questions, we

have explained how to eliminate the odors from the toilets, urinals, pipes and traps. The other source of odor is the floor and by the use of an antiseptic detergent, coupled with the previous suggestions for toilet cleaning, the odors will be completely eliminated. Materials containing "santophen No. 1" (manufactured by Monsanto Chemical) have proven very satisfactory for this condition. Certain products available today have a residual effect and, when rewet, will reactivate themselves. Also a "temperature engineered" product will help.

Q. Would it be economical for a plant to use the regular household detergents or soaps for cleaning floors?

A. I don't believe so. These products, as you have implied, have been made for household usage. Straight detergents which are most commonly used for household uses—i.e., dishwashing, laundry, etc., are not, in my opinion, ideal for floor usage. The suspending qualities for floor usage are very poor. The use of so-called synthetic organic materials seems to be much more satisfactory.

Q. A reader tells us that his management has forbidden him to use wax on his plant's floors because of the safety hazards, and the floors therefore are in a deplorable condition and difficult to maintain. Is there any method of overcoming this problem?

A. Certainly there is. There are floor finishes available today which contain no wax and actually "slow" a floor down. Additionally, there are waxes which contain "ludox" (a Dupont product), which virtually eliminates any slip hazard.

If management will not allow use of this type product, then the use of a dustless mop, as mentioned earlier, will improve the appearance and condition of his floors with no safety hazard.

Q. "Plant maintenance is an awful headache, and I have dozens of so-called experts calling on me advising me that I am using the wrong product, or I am paying too much for what I'm using," complains a reader. How can maintenance men keep these "wolves" away from their doors?

A. Of course, you have put me on a spot by asking this question, because our men are probably also calling on them. Our answer to this problem has been to train our representatives through technical manuals, manufacturers' training courses, etc.

There are, of course, many other reputable firms of our type and I feel that if maintenance men will put their confidence in the representatives of the reputable firms, then their jobs will be less confusing. As for a salesman telling them that they are paying too much for what they're using, let me remind you that in our American economy, the customer generally gets what he pays for. Also, the representative must make a reasonable profit on his sale in order to provide the time and service these men deserve.

Thank you very much, Mr. Friedenthal . . .

INCENTIVES FOR YOUR MAINTENANCE MEN? . . . . . continued from page 41

factory manner. We expect soon to explore this idea further."

4. Western paper products manufacturer (Production Manager): "We have a small maintenance department that is tied directly to our shop labor contract, and until our home office deems it advisable to start an incentive program, we will not even investigate the possibility of having one."

Valid objections?

5. Another Western aircraft plant (Plant Engineer): "The complex labor relations problems arising from having several trade unions involved are our reasons for not using incentives in our maintenance operations."

Do the reasons stated above constitute valid objections in all cases to maintenance incentives? Consensus among firms who have tried them is that they are not. In brief, here are the reasons:

Mostly "no excuse"!

"Idea has never occurred to us." No excuse.

"Jobs are not repetitive enough": Maintenance-to-production or repetitive-to-non-repetitive ratios can be determined, and incentives then based on these charted ratios (see example above).

"Maintenance force is too small": Experts now pretty well agree that incentives are economically feasible in plants employing as few as *ten* maintenance employees.

"Trade unions make it too complex": Unions have not been known to object to wage incentives. They do object to their administration. Administrative skill should get around this one.

Knowledge is the starting point

Believing that it is wiser to know all of the in's and out's of maintenance incentives before you discard (or disregard) the idea for your plant, we suggest that you study some of the latest published material on the subject. We have listed here a brief bibliography that you can use as a starting point—it includes the best references that we could locate. Source and price are indicated in each case.

To give you an advance idea of what's required for such a program, and your probable steps in getting one started is the purpose of the boxed material on page 40. And to emphasize the fact that much preliminary work must be undertaken in order to obtain satisfactory results is the purpose of the discussion boxed at the top of page 41.

BEST REFERENCES ON MAINTENANCE INCENTIVES . . .

Incentive Payment of Maintenance Workers, W. C. Cooling—A complete review of all the systems that have been tried, all the pros and cons, and do's and don't's, this is a big-sized chapter in the just-published big-sized (1,500 pages) *Maintenance Engineering Handbook,* edited by L. C. Morrow. The book covers in great detail every maintenance problem you're likely to encounter. Well worth the $20.00 price, get it from McGraw-Hill Book Co., 330 W. 42nd St., New York 36.

Incentive Plans for Direct and Indirect Workers—Contains material illustrating application of time study to maintenance jobs, and how repair jobs are evaluated. Price not known (ask 'em to bill you.) Production Series No. 188, 24 pages, 1950: American Management Association, 1515 Broadway, New York 36.

Maintenance Gets Premium Pay Plan—How one firm worked out its maintenance incentive program and the results (this one is mentioned in more detail in the article above). Magazine may still have tearsheets available, but better ask for a bill. June 1956 issue of "Plant Engineering" Magazine, 110 So. Dearborn St., Chicago 3. Also, you might ask if they still have tearsheets of page 107, December 1956 issue, where appeared a discussion, "Applying Incentives to Maintenance Workers."

How to Set Up Incentives for Maintenance Jobs, E. A. Cyrol—What conditions you need, and the steps by which it should be worked out, complete with charts and sample forms. Box material, page 40, summarizes it for you. It's part of a 30-page Maintenance Manual, published in the January 1955 issue of "Mill & Factory" Magazine. You can get the entire Manual for 25 cents from the magazine at 205 E. 42nd St., New York 17.

Incentive Wage Systems: A Selected Annotated Bibliography—Plenty of other references here, part on maintenance incentives. Priced at 50 cents from Industrial Relations Section, Dept. of Economics & Sociology, Princeton Univ., Princeton, New Jersey.

HOW TO MAKE WESTERN PLANTS HUMmmm

Described on the next 35 pages are the newest approaches to specific maintenance and plant engineering problems. Because the 15 panelists are all Western plant operating executives, their ideas are especially applicable in typical Western plants.

Area vs. centralized maintenance —what's best for your plant?

PANELIST

A. J. WILSON, JR.
Plant Engineer, Ampex Corp., Redwood City, Calif.

AREA MAINTENANCE? . . . Or centralized maintenance? How do you determine which is preferable for your plant? Here are some thoughts on how to determine your answer, particularly if your maintenance department is relatively small but you must consider future growth.

As background for these thoughts, here is a thumbnail sketch of our situation at Ampex Corp. In 1952, we had about 12,000 sq. ft. and 65 employees. In May of 1957, we had grown to about 225,000 sq. ft. with 2,000 employees. Simultaneous increase of maintenance and janitorial personnel was from three persons on one shift to 45 persons on three shifts.

As a result of this rapid growth, we have been shifting from a "seat of the pants" type of operation to one which is by necessity developing many of the attributes of organized planned maintenance. In our planning, one of the most controversial subjects has been that of centralized vs. area maintenance. At present, our organization is basically centralized, although a portion of the maintenance personnel perform most of their work in specific areas. In fact, there are maintenance work stations and tools permanently established in these areas.

With our three-shift operation, available skills are spread rather thin. Individuals are required to be quite versatile. Work load is about equally divided between maintenance and repair and miscellaneous construction.

Under these circumstances, we have had to decide for future planning if this organizationally centralized maintenance operation is best suited for our long term growth pattern, or if it should be shifting toward completely decentralized area maintenance.

Advantages of centralized plan

Here are the advantages I see in a centralized maintenance program:

1. Most important is the general flexibility of men in the labor pool. Work can be planned, coordinated and scheduled for three shifts in quite a fluid manner with reasonable ease.

2. Major maintenance capital equipment can be centralized in a maintenance shop with minimum duplication and good accessibility can be had by all maintenance personnel.

3. Work backlog data and priorities can be kept by craft. Trouble areas can be spotted and the associated subcontracting load evaluated.

4. Standardization of methods, procedures, materials and tools is directly controlled and can be carried out on a company wide basis. Liaison with all company groups is through one office.

5. There are advantages to centralized buying, stocking and control of spare parts, construction materials and service materials. Minimum stocks are more easily maintained with less duplication. Quantity buying can be accomplished with better price breaks.

6. Clerical labor and duplication of records is minimized. General maintenance costs can be evaluated at a central point.

7. Major construction and repair operations can be centrally planned with maximum coordination.

8. Preventive maintenance programs and standard lubrication practices may be uniform plantwide.

9. Personnel administration of maintenance groups can be uniform throughout the plant. Job specifications, personnel evaluation, work standardization and various training programs may be applied equitably to all personnel.

All of these factors appear to be positive, but even in a plant the size of ours, there are some major pitfalls. Travel time to and from the centralized maintenance shop becomes a consideration which can be only partly alleviated with bicycles, scooters and trucks. Remote buildings do not always fit in easily with a centralized maintenance pattern.

Operating department heads are not completely responsible for the op-

NOTE: Much of the material for this special symposium is based on discussions at important Western plant maintenance conferences during the past three months. In these cases, numbers at the end of the discussions indicate the conference, as follows: (1) Western Plant Maintenance & Engineering Conference, June 11 and 12, 1957, San Francisco, sponsored by Clapp & Poliak; (2) Electrical Maintenance Conference, April 16-18, 1957, Los Angeles, sponsored by Electrical Maintenance Engineers Assn. of So. Calif.

erating efficiency of their equipment and facilities, nor are they completely in control of all the money spent within the areas of their responsibility. When equipment fails with resulting production down-time, there is always a possible crutch of divided responsibility and buck passing.

Advantages of area maintenance

There are certainly many advantages to area maintenance in some situations:

1. Area maintenance under operating department supervision may result in better coordination of planned equipment down-time. However, this requires a willingness on the part of production supervisors to permit productive maintenance to interrupt production schedules.

2. It is quite true that production supervisors do feel, and sometimes with justification, that area maintenance may provide quicker service in case of breakdown and minor repairs.

3. Area maintenance can also permit more flexibility in personnel due to smaller groupings. The trend to rigid craft organization as a plant grows in size may be delayed through the area approach.

I feel that for a plant the size of ours and even for one that is somewhat larger, centralized maintenance may be a better alternative. This is only true so long as buildings and facilities remain a cohesive unit. As large independent operations are installed in more remote locations, area maintenance programing will likely develop.

The system which is preferable for an individual plant. (i.e. area maintenance vs. centralized maintenance, or a combination of both) should be resolved on the basis of which does the best job at the least cost to provide the desired results.[1]

For successful maintenance— get people to work as a team

PANELIST

A. G. SIRA
Master—Shops,
U. S. Naval
Shipyard,
Pearl Harbor,
T.H.

OUR recently installed maintenance control system is operated on as simple a basis as possible. Five basic forms constitute the paper work required. These are (1) Inspection form for mechanical devices, (2) Inspection form for electrical devices, (3) Internal work order, (4) Request for assist trades, (5) a 20-year history file card.

There are 48 people in our maintenance organization, including five in the control division. Getting these people to work as a team was our initial problem.

First step was *personnel indoctrination.* Supervisory personnel were indoctrinated into the program by holding round-table discussions, where pros and cons were discussed. After they agreed to give the program a trial, our next problem was to sell our maintenance mechanics. We held regularly scheduled meetings with all our maintenance men, fully explaining how our new program was expected to function, what it was expected to accomplish, and how they would fit into the program. Representatives of the various trade unions and employee groups were also invited to sit in at these conferences.

It was during these indoctrination sessions that we were able to determine who would best be suited for what particular job. If during the discussions the comments of a certain mechanic showed that he was a methodical person, we earmarked him for our preventive maintenance group. If a person showed himself to be the type that desired nothing more than to dig in and perform actual repairs, he was selected for the repair section. Where a person showed complete disagreement and lack of desire to cooperate with this program, he was transferred out of the shop within his own trade to one of the other production shops.

Give 'em lottsa pep!

A few months of trial indicated that our operating personnel were in need of *occasional pep talks* in order to retain their enthusiasm. We found that our people wanted to know the results of their efforts, how much money we were saving, where we were saving it, and what the impact of these savings was on the Shipyard.

Regularly scheduled meetings between me as master mechanic, my subordinate supervisors and my maintenance mechanics are now held to acquaint them with the progress of their work, to discuss with them the areas in which they have shown the greatest improvements, and to criticize them for areas where improvements are lacking.

And an important part of the program is the *training of our supervisory personnel,* not in the elements of their trade, but in the elements of personnel relations—to teach them to extract the most out of each employee, to be able to run their gangs fairly and impartially, without pampering.

I was fortunate enough to be selected several years ago as a candidate to attend the Harvard Advanced Management Program, and while there I learned the case method of teaching. This method takes actual cases from private industry in matters of policy and in personnel administration. These cases are thoroughly discussed in the classroom and solutions to the problems are sought from the students. It is this method that I employ in training my supervisors.

Don't hold back secrets

This has worked well and has paid off in many ways. First, the line supervisor realizes that there are no secrets being held from him. He begins to gain a greater insight into the method of thinking employed by his superiors and begins to appreciate the reasons for a great many of their decisions. And I have grown to know the men better and to appreciate their problems.

Other advantages, of course, lie in the general management of the shop. Management problems and personnel problems are now being analyzed by line supervisors and usually resolved before being presented to me.

The training of first-line supervision in problems of personnel and management cannot help but show results in the increase of production and a rise in the quality of work performed. Being in daily contact with production personnel, first-line supervision is in a position to exert the greatest impact on the end result. The first measure of success usually lies in a decrease of disciplinary actions, diminished grievances, fewer absentees and an improved product.[1]

...ELECTRICAL TROUBLE SPOTS PINNED DOWN...MAINTENANCE MEN PUT "HARD SELL" INTO PROGRAM...LIP S

Good sense(s) plus luck means proper electrical maintenance

PANELIST

T. M. SPYDELL
Electrical Maintenance Foreman, Lever Bros., Los Angeles

PROPER MAINTENANCE of electrical equipment requires that the maintenance man use all of his senses—plus a little luck.

If the maintenance man will tour all machinery and *look, listen, feel* and *smell* the equipment, he can spot trouble before it becomes serious. Another preventive measure is to use recording instruments periodically and keep a file of the charts. Compare the charts to see when trouble is starting and to use for future comparisons.

Here is a check list of trouble spots:

Lubrication—When the lubrication of the driven machine is neglected, it reflects back into the electric drive unit. Oil or sleeve bearings have to be watched closely; they should have periodic checks so as not to be forgotten.

Remember that 110-v. motors are hard on oil bearings. With ball bearings the worst offender is too much grease; this is worse than too little grease.

Brushes—If brushes are not checked periodically they can cause real trouble. Short brushes and brushes freezing in the holders start to arc the commutator. If this is not checked, the machine is soon out of service.

Heat—is a bad offender in causing trouble to electrical equipment. Heat can be caused by dirty equipment, poor connections, overloads and by high surrounding air temperature. This is one of the troubles that can best be checked by actually feeling the equipment.

Mechanical injury—Electrical equipment should be installed and protected to prevent mechanical injury. The code covers installation, but guarding is something that has to be done by the maintenance man. I believe that if ¼-in. material will support or protect the equipment, you should use ½-in. material. Guards and supports have to be very sturdily built. Operators can be very rough on equipment, and if you have fork lifts in the plant, protection becomes doubly necessary.

Loose connections—A loose connection will give erratic operation and is sometimes hard to locate. If connections are loose on equipment carrying large amounts of current, they will burn terminal blocks, insulation or mounting panes. This will also ruin the bus bars or wires and surrounding equipment.

Grounds—are troublesome if you have an ungrounded feeder system. It is possible to get two grounds each on different phases. When this happens the smaller circuit will be kicked off. Sometimes it burns the wire, relay or motor—whichever happens to be grounded.

Control circuits—keep them simple. Do not add a lot of "gingerbread" to the circuits to impress someone. When you do this you are asking for mishaps. Sometimes you have to go to a complicated circuit, but the simple circuit makes for easy maintenance and trouble shooting.

You can learn by experience which equipment will give trouble, the frequency with which the trouble occurs or the circumstances that cause certain trouble. With a preventive maintenance program—and a little forethought and luck—you will be able to stop trouble before it starts.[2]

How to get better acceptance of maintenance programs

PANELIST

KEN SHAW
Dist. Maint. Sales Sup., Westinghouse Electric Corp., Los Angeles

HOW CAN WE *get better acceptance of sound preventive maintenance programs?*

Too often there is lip service to preventive maintenance. This applies particularly to a management which professes to agree in principle but won't authorize the necessary expenditures to set up a good preventive maintenance system.

If this condition exists it is a sales problem—and it is *your* sales problem. Basically, you should have confidence that in the *fundamentals of preventive maintenance* you do have something to sell. Obviously, you must have a sound program.

Having developed this, you must sell it to management. It is quite obvious that your plant was not established to practice preventive maintenance. Preventive maintenance is a tool by which the general plant efficiency may be improved, operating costs lowered, production increased . . . and which can result in a higher profit return to the stockholders.

Therefore, the maintenance people must be part of the plant team whose end objective is *greater profit.* Being a team operation, preventive maintenance people must sell their function to their contemporaries in production, manufacturing and engineering.

Preventive maintenance people must convince their contempories that preventive maintenance is essential to their success. *The selling of management on adequate preventive maintenance will be easier if the team is for it.*

The sale of preventive maintenance to management must stress the *profit angle.* Best techniques of reports and requests to management should be studied by the preventive maintenance promotors. To get preventive maintenance its share of the budget, the case must not only be well presented *but sold.*

Preventive maintenance has moved out of the bush league into the majors. As we look into the future of greater

automation, more complicated machinery, and more machines controlled by fewer men, the part of preventive maintenance in the profit-making team will become more important.

The capability and resourcefulness of the maintenance personnel must keep pace with the growth of the importance of the job. And as we speak of complexity, let us not forget that the preventive maintenance man *must keep up with technical developments.*

I heard an interesting comment about a recent change to electronic control in a paper-mill. A maintenance man said, "It used to be that you could find the trouble in five minutes and it would take hours to fix it. Now it looks like it would take hours to find the trouble and minutes to fix it." The story well illustrates the preventive maintenance preparation needed. The story also illustrates the educational problem presented by these control developments.

To summarize:

1. Planned preventive maintenance *is* needed in industry.
2. Preventive maintenance is now an important factor in the profit picture and will become even more important in the future.
3. Maintenance personnel should sell their contemporaries in production, manufacturing and engineering that preventive maintenance is essential to *their* success. This is a step to selling management.
4. Maintenance executives should constantly endeavor to improve their technique of selling management on preventive maintenance as a profit factor.
5. Maintenance people must keep up-to-date on equipment and material developments.
6. Planned preventive maintenance is out of the bush league class. The complexity of automation, rising costs, and the need of increased productivity is making preventive maintenance a vital factor in industrial economy.[2]

How you can achieve good maintenance control

PANELIST

L. V. HERICH
Plant Engineer, Cannon Electric Company, Los Angeles

THE NEED for effective planning and scheduling of maintenance work is essential in our plant, as it is operated on a 24-hour basis, five—often six—days a week.

Our maintenance department consists of 17 men in machine repair, 7 electricians, 5 carpenters and 4 sheet metal men.

In *planning* we are trying to develop a systematic organized method for analyzing and laying out work and procedures, to utilize men and materials as effectively as possible.

In *scheduling* we are trying to determine when each phase of the planned job may be done to fit in with production schedules, receipt of material, and availability of men and equipment.

Here is a breakdown of our maintenance work: (1) requested; (2) routine; (3) preventive maintenance inspections; (4) periodic equipment overhaul; (5) capital expenditure improvement; (6) emergency repair work; (7) non-maintenance work.

Most requests are received in the plant engineer's office or through contact with the maintenance foreman. In an emergency, our paging system is used. The foreman studies the request and checks with the production people if necessary. He then plans the job and arranges for material from central stores, or writes a purchase requisition.

In each maintenance department we have installed a wooden board, listing employees' names. Below the names, we have set up three separate rows to hold "maintenance authorization and time cards." Individual rows are lettered from top to bottom as follows:

1. Backlog
2. Present
3. Complete

On the right are two pockets lettered "Repairs General" and "Preventive Maintenance General."

About 4 p.m. each day the foreman sets up the board for the next day's work. Repair requests are placed in the *backlog* pocket in order of importance. Only jobs for which needed material or tools are on hand are assigned. Jobs delayed for material or other reasons are placed in "repairs general" pocket.

The employee picks up the first card in the *backlog* pocket under his name. He notes description of job, location, tools needed; then he puts down starting time and inserts card in the *present* column. When job is completed, the employee marks down actual time and material and puts card in *complete* column. You'll note that these cards are an effective means of telling where an employee is and how much work he is doing.

Rotate routine jobs

On "Routine Maintenance Work" certain men are assigned certain jobs that they are to handle on a daily or weekly basis. Jobs are rotated so that all the crew is familiar with them.

In "Preventive Maintenance" inspections on equipment are made at least every four months. Work is listed on a work authorization card which is slipped into an acetate pocket containing a sheet of instructions. The acetate pocket is then put into the preventive maintenance general pocket, and is scheduled by the foremen to individual men.

In regard to "Periodic Equipment Overhauls," the problem of scheduling is reduced considerably and is mainly a problem of planning. Since only one man works full time on machine overhauls, work is scheduled to coincide with the return of the reworked machine and removal of the machine to be worked upon.

"Capital Expenditure Improvement" is scheduled in coordination with the departmental foreman. Once the job is scheduled the men will work on it until completed. Only in case of emergency are the men pulled off.

Since "Emergency Repair Work" cannot be planned, we give it top priority—especially when it will affect production. We try to have one or more men in the shop available to handle this type of work. But if this cannot be done, it is not difficult for the foreman to look at the schedule board and quickly locate one or more men.

A work card is made out and types of emergency repairs made are recorded along with the materials used. These cards help us in determining which items need closer inspection and if these items should be included in our preventive maintenance program.[1]

...MORE PROJECTS FINISHED ON TIME, WITHIN BUDGET...STAND MADE FOR AREA MAINTENANCE...PLANT A

"Layout" of a new project keeps maintenance reins tight

PANELIST

W. J. SMITH
Section Head, Plant Engineering, Goodyear Aircraft, Arizona Div., Litchfield Park

CONTROLLING new projects—seeing that they are finished properly on time, and within the budget—has been achieved by our Plant Engineering Dept. through a formal presentation of a project, called a "Layout."

The Layout is drawn up after management has given tentative approval to a preliminary study of a project. The Layout is the result of thorough investigation and study by an engineer who has familiarized himself with the problems, has reviewed applicable specifications, determined production schedules and facilities to be supplied by other departments, and the total cost.

These and other details of the project are listed on the Layout, which is then routed for approval to foremen of departments affected, to Production Supervision, Industrial Engineering and finally to the Plant Manager. Usually some minor revisions are made during the approval cycle.

When the Layout is approved, we have started the first control of a project. The estimated cost will result in a budget request, thereby controlling funds; the preliminary engineering is completed and equipment requirements have been determined, thereby determining procurement and installation time.

Approval of the Layout is the signal for action by the Plant Engineering Dept. Each individual item on the Layout will be a separate Engineering Order. However, at this point, the individual items may be assigned to another engineer who will do complete engineering in his specialty (Civil, Electrical, Chemical, etc.)

This assignment of work to specialists insures that sound engineering principles are followed on any project. It should be noted that in other than simple projects, these engineers have contributed to this Layout and to the preliminary estimate.

During the Engineering phase of the program, liaison is started with other departments concerned: The Maintenance Group that will do the work is informed as to the scope of the program, the time element involved, and the overall estimate; the Production Department is informed as to the status of the program and provided with an estimated completion date.

Individual engineering orders, after approval of the Accounting Department to check proper job charge, are released to the Maintenance Department. The ideal situation for most projects is release of all orders for a project at one time.

When the orders are released to the Maintenance Shop, the program develops into problems of maintenance manpower to meet estimated completion dates, expediting deliveries of materials, coordination with production departments, and coordination with other programs underway at the same time.

Maintaining good liaison

Close liaison is maintained between the Maintenance Department and the Engineering Department to determine priority on certain phases of the program, to keep abreast of changing requirements, or to resolve unforeseen difficulties. A request for overtime is usually mutually agreed upon by both departments.

Incidentally, overtime premium is often justified, based on increased efficiency of maintenance when operating *without the constant interruption of routine repair calls.* We have cases where major relocations or installations have been made at less than estimated costs, when the work was done on an overtime basis.

The engineering orders as a result of a Layout usually come under the control of one supervisor in the Maintenance Department. This supervisor, late in the day, reviews the orders that can be worked the next day, and requests from the individual craft foreman the number of men required.

Each of the men assigned to the installation works within his own classification, but reports to an Installation Supervisor during his time on that job. His daily time card or job ticket shows the number of hours worked on that project. These time cards are forwarded to the Accounting Department, and, together with materials requisitions, provide an exact cost of each order and total project cost.

Upon completion, the engineering work order is returned to the Engineering Department and when signed off by the engineer, the order is filed. Upon completion of all the orders on a particular Layout, the Layout is signed off and it too is filed.

The foregoing traces a project from inception to completion: *engineering control* has been obtained by assigning a specialist to individual orders requiring a specialist; *cost control* has been obtained with estimates on individual engineering orders, and *time control* has been obtained through close liaison between Maintenance and Plant Engineering.[1]

Area maintenance favored for firms over million sq. ft.

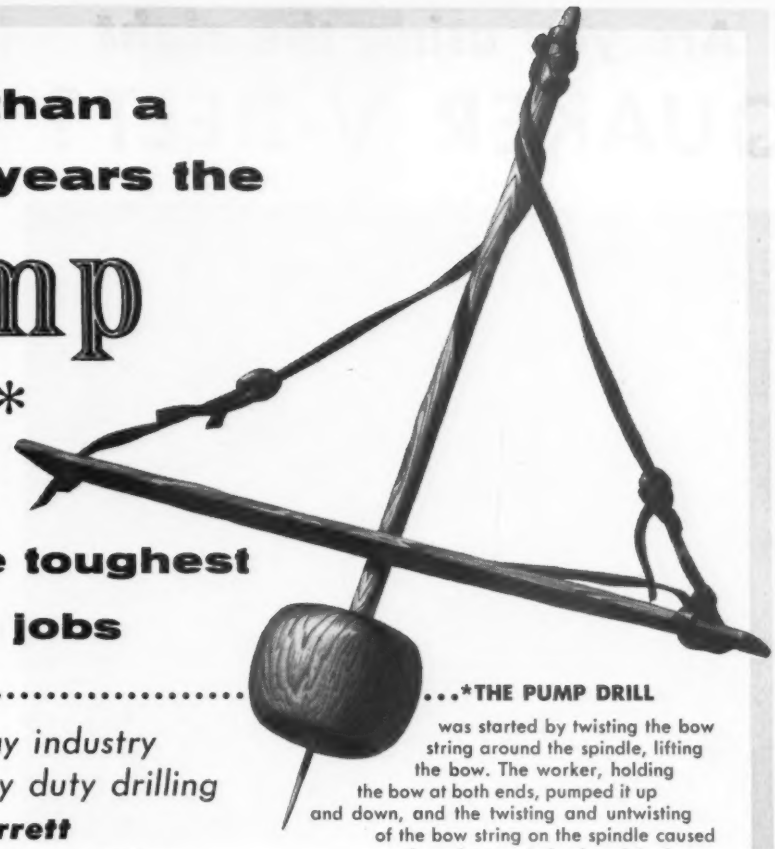
PANELIST

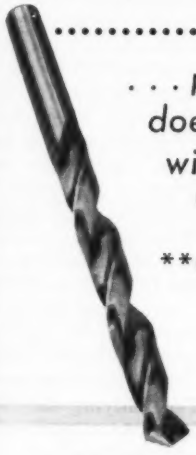
W. E. FORE
Plant Engineer, North American Aviation, Los Angeles

FEW MEN in plant engineering are neutral on the question of area vs. centralized maintenance. My stand: *I favor area maintenance organization for industrial plants of a size of 1,000,000 sq. ft. or more.*

Perhaps my stand is based on the peculiarities of my present job environment. The responsibilities of the plant engineer at North American

For more than a thousand years the Pump Drill* handled the toughest hole boring jobs





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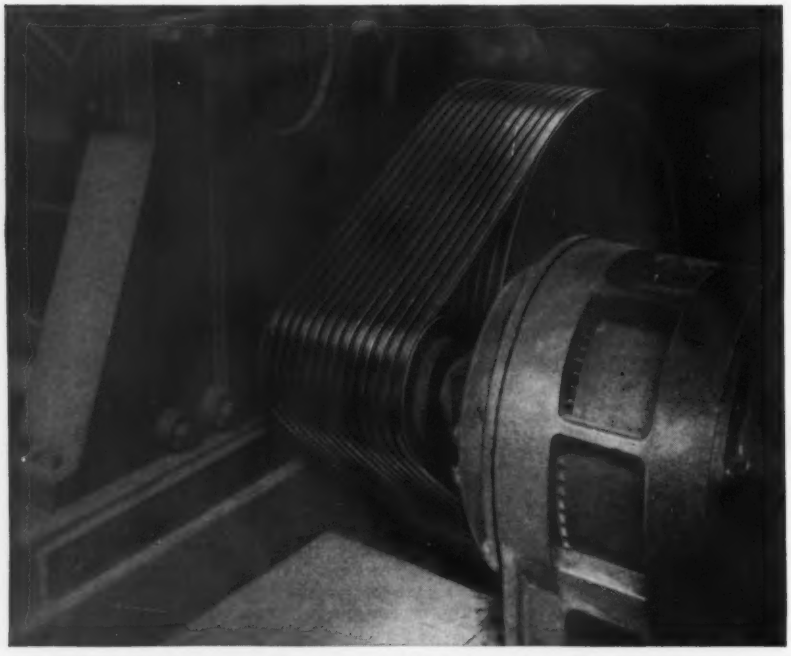
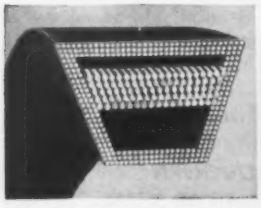
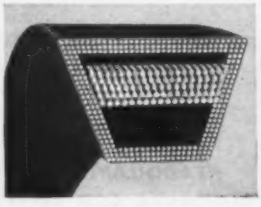


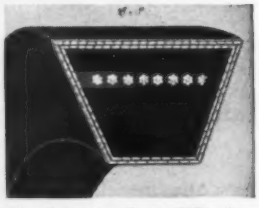
Quaker Rubber Division offers a full line of tough, long-lasting V-Belts. Each is designed to give long, efficient service. And each is designed to do a specific job. For example . . .



For drives requiring additional horsepower, the Quaker Super V-Belt—40% stronger than standard V-Belts—is available in a complete range of sizes, AP through EP cross-section.



For normal operating conditions without special speeds, loads or center distances, Quaker has the Multiple V-Belt at reasonable cost. Available from 26" to 660" in all cross-sections from A to E.



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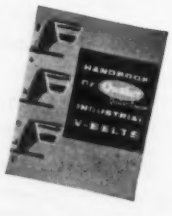

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HKP QUAKER RUBBER DIVISION
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Aviation are described as follows: *"The plant engineer is responsible for determining the requirements for, to initiate the procurement of, to construct or manufacture, and to maintain in good condition the land, buildings, machinery and equipment which are used by North American Aviation, Inc., in the production of aircraft and other products required by our customers."*

In order to discharge these responsibilities, the plant engineering organization contains the traditional construction and maintenance department, a plant engineering staff, industrial planning department, and an industrial engineering department. Our Los Angeles Division plant consists of about 4,500,000 sq. ft., 75% of which is located at the L. A. International Airport, with the remainder scattered throughout L. A. County.

Within our plant engineering organization, we actually use both the centralized concept and the area concept of maintenance organization. For example, at our Douglas Street facility, with about 800,000 sq. ft. of factory area and 250 maintenance employees in addition to 30 industrial engineering and plant engineering personnel, we have an area maintenance department. Meanwhile, at our main plant on the L. A. Airport, with the main plant area being about 2,500,000 sq. ft. and nearby outlying facilities having about 1,300,000 sq. ft., we use the centralized maintenance organization. The outlying facilities are not large enough to support separate maintenance activities.

Under these circumstances, here are the pros and cons we see for the two types of organization. The advantages of area maintenance appear to be:

1. Maintenance crews respond more rapidly to emergency situations and handle routine maintenance more expeditiously.
2. By limiting the areas for which each member of supervision is responsible, we have provided closer control over the maintenance work force which results in a higher degree of effectiveness.
3. Each individual maintenance mechanic has developed a proprietary feeling towards *"his machines."*
4. Operating department's supervision is better satisfied with the maintenance effort. There is very little dissension between operating supervision and maintenance supervision.
5. Supervisory personnel develop greater breadth. They become "Maintenance Supervisors" rather than plumbing supervisors, electrical supervisors, etc.
6. We have better inter-craft coordination.
7. The amount of red tape in this department is reduced considerably relative to the

centralized maintenance department.

8. This department has a higher morale and *esprit de corps* than the other maintenance departments.

9. The ratio of supervisory personnel to the work force is smaller than in the centralized department.

The disadvantages of area maintenance appear to be:

1. Slightly more area is required.
2. There is some duplication of machinery and equipment.
3. It is more difficult to maintain uniform maintenance standards insofar as the trades are concerned.
4. There are some labor relations problems in the craft union areas where we have more than one bargaining unit represented within a supervisor's work force.

At our main plant area where we operate on the basis of centralized maintenance, and where we have two large maintenance departments, we have found the following advantages:

1. The slightly higher utilization of any particular skill which results in improved skill utilization.
2. We are able to develop higher degrees of specialization within each trade group.
3. Trade supervisors tend to develop high degrees of proficiency and skills in their given trades.
4. It is easier to maintain uniform maintenance standards throughout the assigned areas.
5. There is very little duplication of machinery and equipment.
6. The supervisory organization more closely aligns itself with the craft union groups, making for fewer jurisdictional problems.

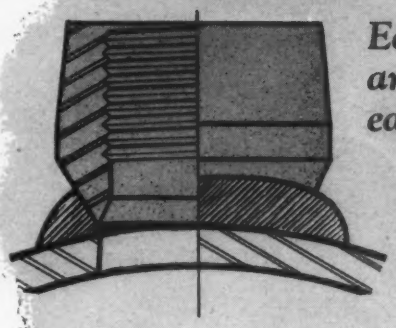
Now, in order to make the balance fall in the direction that I prefer, I have managed to list five disadvantages for the centralized maintenance department. These are:

1. It is more difficult to coordinate both maintenance and construction work involving more than one craft.
2. The maintenance departments tend to respond more slowly both to emergency and routine requirements.
3. Since the maintenance mechanics are not assigned to a particular area or a particular group of machines, they have no proprietary feeling towards the equipment they maintain.
4. Offsetting the advantage of a higher degree of technical skill developed by the lower levels of supervision, we haye found that supervisors in the area maintenance departments develop better administrative and conceptual skills.
5. A common complaint from the operating departments is that we have too much red tape in the centralized maintenance department.

Although in my working environment I favor the area type maintenance organization, it is my opinion that in the final analysis the choice will have to be a personal preference. Either type of organization can be made to operate efficiently.[1]

A New Line of Branch Connections

W-S COUPLETS



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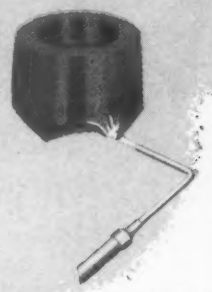

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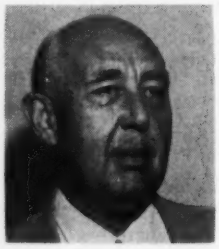
...GLARE FACTOR LICKED...NO D

Modern plants need adequate lighting without discomfort



PANELIST

URBAN BEH

Consulting Lighting Engineer, Newport Beach, Calif.

MODERN PLANT TASKS REQUIRE prolonged concentration on fine detail at low levels of light, frequently under serious glare conditions. This is especially harmful to the eye.

The aim of the lighting engineer is to provide an adequate quantity of light with least possible glare discomfort. This involves careful planning of the lighting system, often to the point that each visual task be treated individually.

Visual comfort is paramount, yet closely allied are physical and psychological comfort. Together they make the *difference* between strained, irritable, nervous employees on the one hand . . . and interested, happy, cheerful workers on the other.

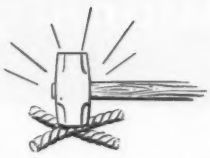
In office lighting there is somewhat of a social aspect, and color plays a part of some importance. As in all lighting problems brightness contrasts are to be watched carefully.

Lighting for production involves many factors because of the infinite variety of seeing tasks. Careful appraisal of all visual problems is mandatory in any proper design. It is especially important in the more critical seeing areas to avoid excessive brightness contrasts.

There seems to be a point where increased light and improved quality of light do not increase production. Here we must accept the incidental benefits as being worth while. These include better quality of production, reduction of waste and spoilage, reduced accidents and better employee morale. Lower labor turnover results. And these more interested people turn in more helpful suggestions for im-

Which Arrangement Can Take the Most Pounding?

CORDS CROSSED DIAGONALLY?
(as in braided hose)



CORDS LYING PARALLEL?

OR PARALLEL CORDS
Cushioned in Rubber?

as in NYB&P's Exclusive Cord Hose Construction

Notice how all the cords in each of the two pressure-resisting plies run parallel—never crossing as in conventional braided hose. Each cord is cushioned in rubber . . . each ply separated by a layer of rubber! Pressure pulsations and constant flexing cannot create friction between cords, which might result in shearing within the carcass.

The spiral plies pack more brute strength into a hose carcass because they use or nest more strands throughout the entire hose length than can be used in weak braided constructions.

This exclusive cord construction, *like that of a tire,* gives super flexibility to NYB&P's Great Seal Cord water hose, Sterling Cord air hose and Great Seal Asbestos Cord steam hose. These, plus more than a hundred other types of industrial hose, place your NYB&P Distributor in a unique position to fill your every hose requirement.

Look for him in your classified phone directory.

NYB&P

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America's Oldest Manufacturer of Industrial Rubber Products

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What steel products can National produce for you?

With the largest, most completely integrated facilities in the West, National Supply's Torrance, California, plant is fully equipped to meet any of your steel processing needs. Whether your product requires complete manufacturing or a particular forging, foundry, machining, welding, or fabricating operation, National can do your job efficiently and economically.

Shown here are but a few examples of the variety of forms, types, sizes, and weights of carbon, alloy and stainless steels National can make available to you.

Why not let National's complete facilities, engineering skill and production experience fill your specific steel processing needs? Call or write the address below for more information—or better still, plan to visit the plant soon.

Y-shaped juncture forging

Gear box assembly

Die steel blocks

Table casting

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provement of production and operation of the plant.

Most plants have at least some areas where the lighting could be improved. A periodic survey of the system often is helpful in spotting violations of good lighting practice. Some of these violations are obvious, while others are more difficult to detect. The solutions may be simple—or difficult.

The important thing is to appoint someone competent to discover and correct them. The possibilities are practically limitless for dividends on such a project.[2]

How load studies and power factor analysis can save you money

PANELIST

W. C. KING

District Manager, Electric Machinery Manufacturing Co., Los Angeles, Calif.

THE IMPORTANCE of "Load Studies and Power Factor Analysis" —and how plant engineers can use the results of these studies and analyses to save their plant much money—was emphasized in a panel discussion featuring *W. C. King*, Electric Machinery Mfg. Co., as chairman; and speakers *Delfs Pickarts*, power specialist, Southern Calif. Edison Co.; *F. V. Frey*, supervisor, customer relations, Pasadena Municipal Light & Power Dept.; and *Milton A. Brenner*, partner, Brenner-Fiedler & Associates.

Low power factor and its correction was demonstrated by Mr. Pickarts, with a power board he built himself. This had an oscilloscope arranged so that the audience could watch the relationship between the voltage and current waves with different loads.

A large electric light, representing a purely resistance type of load, was thrown on first and the oscilloscope showed the two waves exactly in phase. A small motor was then started up and the two waves separated, with the current wave lagging badly behind. With the motor running, a capacitor was cut in and the current moved back into phase with the voltage wave.

Mr. Frey next discussed the relationship between the electric utility and the power consumer. He explained that it is to everyone's advantage to maintain a good plant power factor.

His talk was illustrated with several case histories showing how customers had saved money by following the utility's suggestions for changing to a higher distribution voltage, replacing under-loaded motors, and installing some form of power factor correction.

A case in point was a plant that had a power factor which average 65% to 68% each month. On a $1,000 monthly bill, the penalty was from $75 to $100, and at the same time a 750-kva bank of transformers was heating up. A plant engineer made a recommendation to install capacitors at a cost of $2,500, plus installation. These were installed about three years ago and today every dollar has been repaid in savings on their power bill.

Mr. Brenner told of the three basic types of instruments used to obtain power factor information. These are indicating, integrating, and recording instruments—listed by the degree of information they will give.

Recording or graphic-type instruments allow the plant engineer to study the charts obtained from these instruments and plan exactly the changes that should be made in his utilization of power.

Mr. King asked this question: "Assuming that you had determined that a certain amount of power factor correction would be advantageous, just how should you go about it?" His answer was that synchronous condensers are out of the question except in very large sizes and there are definite limits to changing motors to ratings more nearly approaching the actual load. There are only two methods remaining: *capacitors* and *synchronous motors*.[2]

How Westerners should keep the roofs on their plants

PANELIST

B. P. LaFORGE

Supt. Bldg. & Equip., Consolidated Electrodynamics Corp., Pasadena, Calif.

THE SAFETY AND EFFICIENCY of our equipment and plant structure (and probably yours too) depend on the water-tightness of the roof. In our Western location, the sun eats away day after day at the roof surface coating, at the saturant in the roofing felts, and at the cementing agent between the felts. Without proper protection from the sun, the roof will fail as leaks develop and rain water enters.

Here are some suggestions on maintaining and repairing roofs, based on our experience.

For temporary repairs, roof coating will help preserve the roof if the felts themselves are in reasonably good condition. However, roof coating is only a preservative like paint. If the felts are badly dried out or rotted, no coating can put new life into them. Roof patching is only recommended in case of damage to an otherwise sound roof. If a leak occurs in a roof that has been watertight for years, it is a loud warning that the whole roof is ready to give up. Patching is just added expense.

In event re-roofing is necessary, selection of the proper specs to be used in re-roofing is governed by the slope or pitch of the roof deck. Generally speaking cap sheet roofs should not be applied to areas having little or no pitch. The proper specs to be used in the situation are gravel or asbestos roofs with a special low melt tar coating.

For re-roofing if the old felts have started to decay, the safe and economical thing to do is to cover or replace them with new felts. Failure to do this may result in costly damage to the building and its contents. If re-roofing is the answer to your problem, keep this fact in mind—first, the old

look beyond the price . . .

you'll see that you get the most for your money in

MATHEWS CONVEYERS

A push button order filling system in which an operator at a control console directs the flow of material from 66 storage lines. Photo courtesy of Gallo Sales Co.

Most plant operating people, when they buy conveying systems, are looking for the equipment that is best for **their** plant—equipment that is designed to meet their individual requirements. They are looking beyond the price . . . looking to quality—to dependability. Mathews engineers have been designing and building conveying systems for over 50 years, and a great amount of this equipment has been applied in metalworking plants. This is why operating people everywhere have an extra measure of confidence in Mathews equipment—and why you see Mathews Conveyers in metal-producing and fabricating plants everywhere.

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roof should be carefully prepared. To insure the best results, the old roofing should be removed completely so that the roof deck may be carefully examined for defects. Rotted boards should be replaced or concrete patched.

If it is not feasible to remove the old roofing, then it should be broomed and thoroughly cleaned. If the old roof is slag or gravel, such surfacing should be carefully removed. Loose boards should be securely nailed and if any rotted boards are in evidence, they should be replaced.

Loose felts and blisters must be slit to permit entrapped water or air to escape. All loose felts should be securely nailed down. Cracks in old felts due to movement of the deck should be properly nailed and stripped before new roofing felts are applied.

Asphalt as a cementing agent

Asphalt is recommended as the cementing agent because it is one of the best water-proofing materials known. However, different asphalts have different melting points. Asphalt should never be heated to a higher temperature than called for in the specifications. Overheating destroys the lighter oils and takes the life out of the asphalt.

All roofs must be nailed strictly in accordance with the manufacturers' specifications. If this is not done, the roof may sag or even blow off. Felts should be embedded in the cementing agent without wrinkles and be properly aligned. Neither too much cementing agent should be used, causing lumps of pitch or asphalt, nor so little cementing agent that a thorough bond with the felts is not secured.

All flashings must be correctly installed. In no other place on the roof are tested roofing practices so important. Some 75% of all leaks occur at the flashings. The time to obtain the ideal flashing is while the parapet walls are being built through the wall flashing.

Against concrete, (where no nailing facilities are provided), ideal flashing under these conditions is built up of successive layers of felts applied to the masonry wall and turned out on the roof. A cementing agent, when hard, becomes an integral part of the wall itself.

Against brick, heavy reinforced

Rely on your AIM*. . . Menasha Container of California did . . .

Steel Strapping Machine unitizes corrugated boxes

Modern ideas call for handling larger units with mechanical equipment. To better serve their customers, Menasha Container of California, Anaheim, straps corrugated boxes in large units with the Acme Steel F3 Strapping Machine. The result is increased economy, ease of handljng, better stacking, simpler inventory counts—and greater product protection. Menasha benefits too—for units are compressed and strapped efficiently in high volume at one centralized location. (Idea No. S3-20)

Acme Idea Man, Ray Vilas worked with Menasha Container to develop this better packaging system.

The F3 successively compresses the unit and tensions, cuts and seals one strap—or two or three straps simultaneously—*while the unit is still under compression.* Air powered and electrically controlled with push-buttons, it applies each strap with uniform, pre-determined tension. After each application, the platen rises and the strapped unit moves down the conveyor. While the following unit moves into the machine, straps are feeding into position for the next application. Units of various sizes can be compressed and strapped in any sequence without machine adjustment.

***RELY ON YOUR ACME IDEA MAN.** His files are full of service-proved Ideas that can be made to work for you. Call him today at the nearest Acme Steel office. Or write: Dept. **WCS-67,** Acme Steel Products Division, Acme Steel Company, 4901 Pacific Blvd., Los Angeles 58, Calif., San Francisco, Seattle, Portland.

ACME STEEL STEEL STRAPPING

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Here's Lufkin

ÇALIŞTIMA İLE İLGİLİ TALİ
1. CİHAZI KURARKEN TEVZİN PİMİ RULMAN YATAĞININ İYİCE TEMİZLENMESİNE DİKKAT ET.
2. STROKE U DEĞİŞTİRİRKEN KRANK PİMİ DELİKLERİNİN İYİCE TEMİZLENMESİNE DİKKAT ET.
3. MUVAZENE AĞIRLIĞINI İLÂVE EDERKEN YOLLARI VE YARIKLARI TEMİZLE. MUVAZENE AĞIRLIĞININ EMNİYET PARÇASINI İHTİVA EDEN UCU KRANKIN UZUN UCUNA DOĞRU OLMALIDIR.
4. ÇALIŞTIRMAĞA BAŞLAMADAN EVVEL MAKARA VE FREN KAMALARI İLE KRANK PİMİ SOMUNLARINI İYİCE SIKIŞTIR.
5. ANİ FREN YAPMA. KUVVETİ TEDRİCEN ARTTIRARAK FREN YAP.
YAĞLAMA
KÜKÜRT VEYA KÜKÜRT MÜREKKEPLERİNİ İHTİVA EDEN YAĞLARI KULLANMA.
"PITMAN" KARNK KOLU: VİTES KUTUSU İÇİN KULLANILAN YAGIN AYNINI KULLAN. YAĞI KAPAK ÜZERİNDE YAĞ SEVİYESİNİ GÖSTEREN TAPA HİZASINA KADAR DOLDUR. FAZLA YAĞ SIZINTILARA SEBEBİYET VERİR. YAĞI HAFTADA BİR KONTROL ET VE ALTI AYDA BİR DEĞİŞTİR.
MERKEZ RULMANI, ASKI, VE TEVZİN RULMANLARI:
YÜKSEK TAZYİKLERE DAYANAN VE AKMA NOKTASI - 15 DERECE C OLAN SAE 140 NUMARALI BİR YAĞ KULLAN. MERKEZ RULMANINI İKİ UCUNDAKİ TAPALARI SÜKMEK SURETİYLE DOLDUR. ASKI VE TEVZİN RULMANLARINI BLOF YERLERİNDEN YAĞ TAŞINCAYA KADAR DOLDUR. YAĞI HAFTADA BİR KONTROL ET VE ALTI AYDA BİR DEĞİŞTİR. YEDEK PARÇA ISMARLARKEN E'BAT, SERİ NUMARASI VE SİPARİŞ NUMARASINI BİLDİR.

"talking turkey"

ÇALIŞTMA İLE İLGİLİ TALİMAT?

Literally, talking Turkey, or Turkish—for this is one of the Operating and Lubrication Instruction plates made up for a recent order . . . 15 carloads of Lufkin 10-foot stroke geared pumping units now in heavy-duty service in Turkish oil fields. This world-wide recognition of Lufkin stamina has very real meaning to buyers of industrial gears. For Lufkin supplies rugged gear assemblies to a wide range of industries. And every Lufkin gear inherits all the strength and knowledge gained in a half-century of building gear assemblies for the toughest service known—oil field pumping units, with their continually reversing shock loads, which operate 24 hours a day, month after month, under the most severe operating conditions. This is the stamina, the trouble-free service, you get when you use Lufkin Gears for Industry.

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PACIFIC COAST DIVISION, 5959 South Alameda, Los Angeles, Calif.

base sheet is cemented to the wall with hot asphalt and the upper edge secured by nails driven into brick joints. The base flashing is then capped with a felt strip. If specified, a metal cap flashing may be inserted into brick joint.

Over-coping—Coping stones on a parapet wall often crack or open at the joints allowing moisture to seep down through the wall and under the roofing felts. This can be corrected in the case of a projection coping by extending the flashing up the inner face of the wall to the under side of the coping in addition, covering the top of the coping.

Drains—A metal flashing should be used sandwiched between the roofing felts. Inexperienced roofers often try to save money at this point and flash with roofing felts instead of metal. This is never safe because the felt cannot be made to lie flat and tight around a circular opening.

Skylights—For a tight joint base flashing, felts should be carried up under the metal skylight flange and on top of curb. Many roofers use a base flashing and run the roofing felts themselves up under the metal flange. This method may cause leaks.

Supports and braces. Leaks often develop where angle supports are fastened through the roofing after it has been applied. A guy wire fastening is a good example. For such places, recommend a "pitch pocket," a copper collar set around the fastening and filled with a plastic or hot asphalt. A careless roofer often merely putties over the foot of the brace, a method that is never safe.

The most important factor to consider is that a "Good Roof is Built" not *put on*. In recover roofing it is almost impossible to cover comprehensively all factors in a specification. Thus, *the lowest figure is often not the best investment.* The small details such as flashings, temperatures of asphalt, lapping of layers, etc., are the governing factors of building up a good roof.

Your roofing contractor must have *integrity and standing* in the community, *experience* in doing quality work so that the workmanship can meet the requirements of the most exacting job, and the *financial stability* to stand behind his work through the years of service ahead for your roof.[1]

Protective devices restrain motor from killing itself

PANELIST

KING D. CHRISTOPHER
General Manager, Clark Controller Company, Los Angeles Division

THERE ARE a number of devices for the protection of motors, but the more basic and universally used is the *overload relay*.

The overload relay is a device to prevent motors from burning out due to excessive current being drawn through the windings. A motor is like a horse, not a mule. A mule will sit down if you give him too much load to pull, but a horse will keep trying until he kills himself. A motor will too, so you have to protect the fool thing.

There are two basic types of overload relays: one is the type that trips on the basis of an *inverse time limit action;* the other is *instantaneous.* Instantaneous trip is used on applications where it is desired to stop a motor at the instant the current reaches a set value. Inverse time limit means that the tripping time of an overload relay is inversely proportioned to the amount of current passing through it.

Any given overload relay is good for a wide range of horsepower ratings through selection of the *proper heater elements* to correspond with the normal current to be carried. Selection of these heater elements is critically important because it is obvious that a heater element designed to carry a heavy current without heating would not feel a relatively light current even though that light current might be twice too much for a small motor.

On most applications, it is desirable

GEARS FOR INDUSTRY
THE Lufkin LINE
OIL FIELD PUMPING UNITS

HORSE SENSE ABOUT HORSEPOWER

V. J. Fawcett

Thanks to Mr. Ed Womble, Sales Manager for Anderson O'Brien Company, who issues an informative monthly bulletin, his latest release has reached my desk, "Horse Sense About Horsepower."

Quote—Horsepower is a common word today. It originated when James Watt was persuading the mine owners in England to replace Horses with his new steam engines to operate pumps. He had calculated that an ordinary "nag" could do about 22,000 ft. lbs. of work, but that a good, sound, strong horse was good for work up to 33,000 ft. lbs. To impress buyers, he chose the higher figure to prove his engines would out-work the ordinary Horses.

Today, the figure still stands. Engineers plying their skills give little thought to James Watt's Horses, but they automatically think of Horsepower as performing 33,000 ft. lbs. of work per minute. Unquote.

Altho many momentous meetings took place during the week of May 12th, and I could tell you about a wonderful all-day program presented by the Student Chapter of AIME at the University of Southern California, and climaxed by a wonderful talk on Turkey by an excellent speaker, I will not. I could tell you about an all-day Industrial Conference at the Ambassador, but I'd better not. And, of course, API's 2-day convention at the Biltmore produced some wonderful stories, but there isn't room.

Mainly, we wanted to pass on this tip about the Horses, and whether it's a Lufkin gear, gas engine or pumping unit, you may be sure their ratings are based on good, strong Horses capable of working at the rate of 33,000 ft. lbs. per minute, per Horse—and that ain't hay!

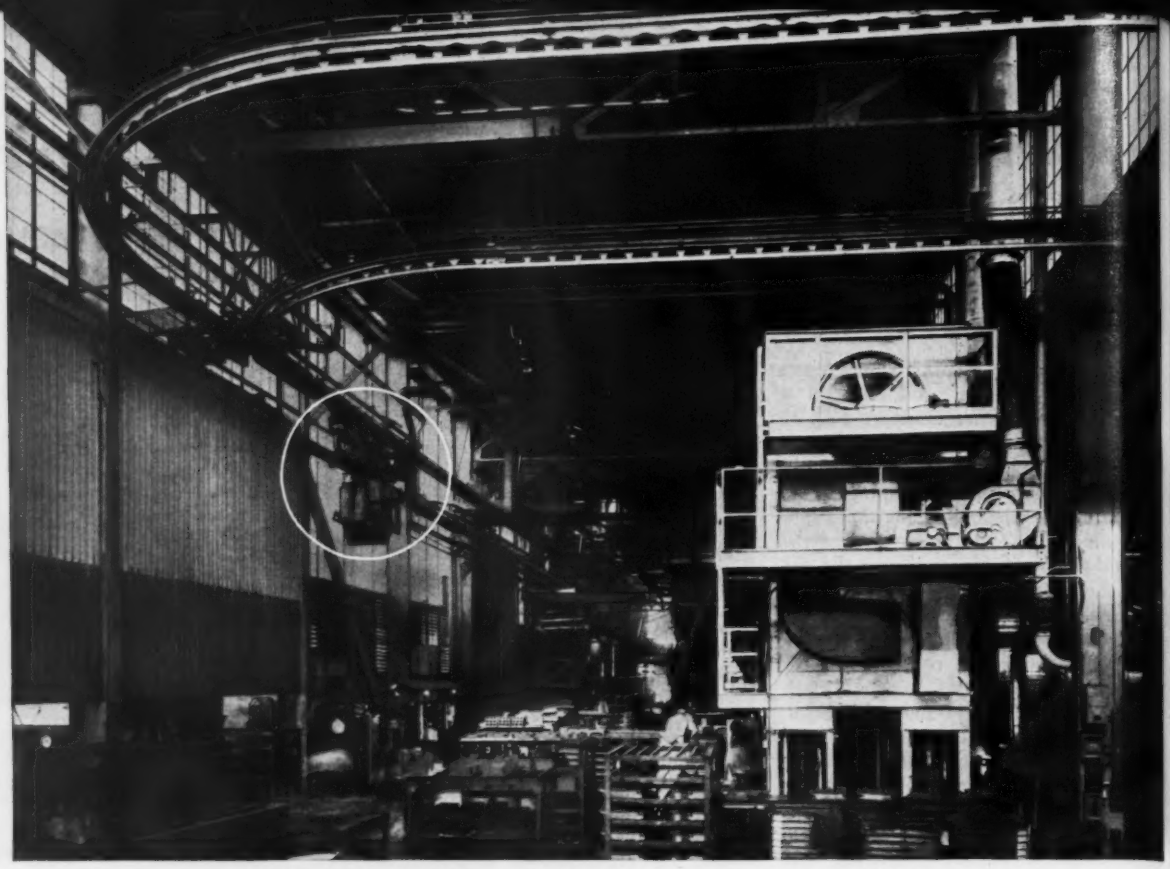
***WARNING:** This tip not applicable to running horses at places like Hollywood Park, Bay Meadows, etc.

Lufkin FOUNDRY & MACHINE COMPANY

... for more details, circle No. 41

... for more details, adv. opp. pg., circle No. 40 on Reader Service Postcard

... for more details, adv. pgs. 62 & 63, circle No. 42 on Reader Service Postcard



Automatic sand distribution system. Encircled is a bucket carrier with 2000 lbs. of molding sand enroute to one of 17 stations as preselected.

General Metals Blanketed W

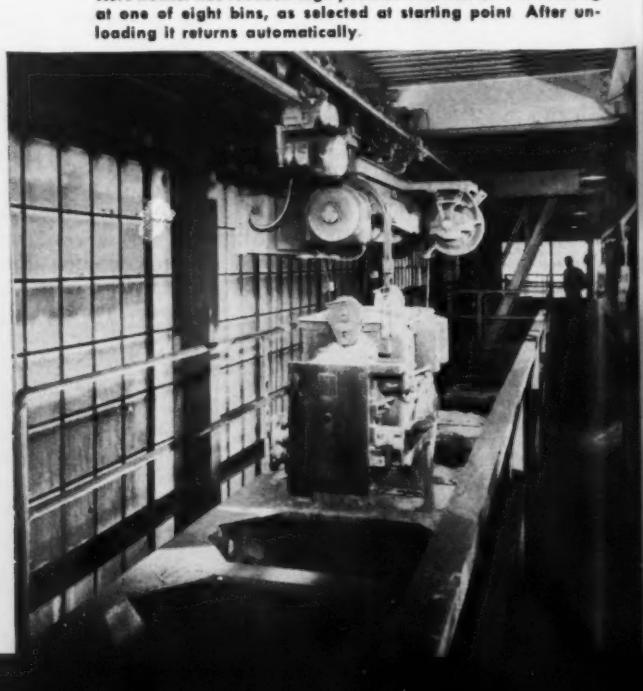
Extensive Overhead Installation Serves Nearly Ever

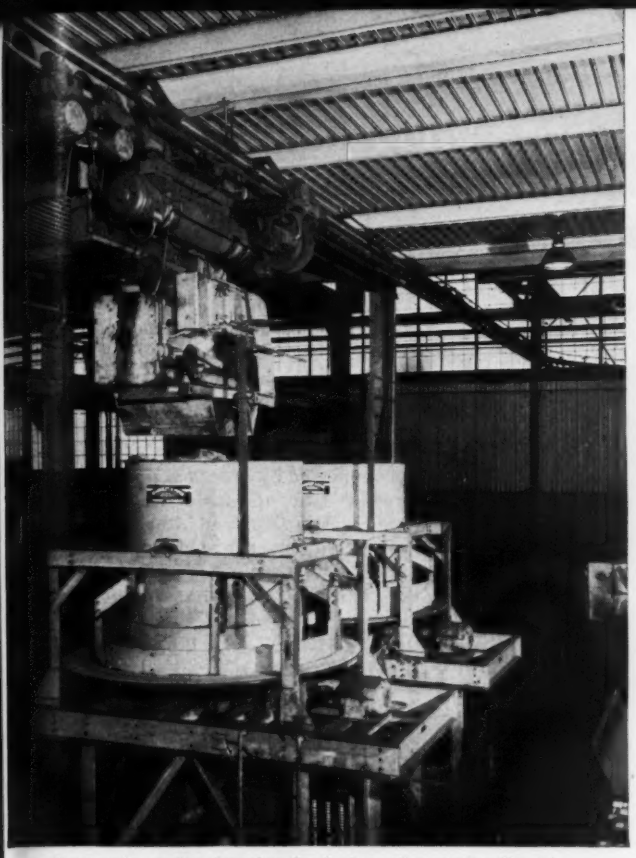
CLEVELAND Tramrail is proud of the important role it has been given by General Metals Corporation in their new foundry at Oakland, California. The new plant, which is reputed to have the most complete facilities in the West, is another outstanding addition to a list of more than 1000 Cleveland Tramrail-equipped foundries.

Nearly every department is served by Cleveland Tramrail. Both manually and electrically operated equipment in capacities from ½ to 10 tons are in operation. Wide use is made of transfer cranes. There are two automatic dispatch systems for core sand and blending materials. One delivers materials automatically to 17 stations. The illustrations

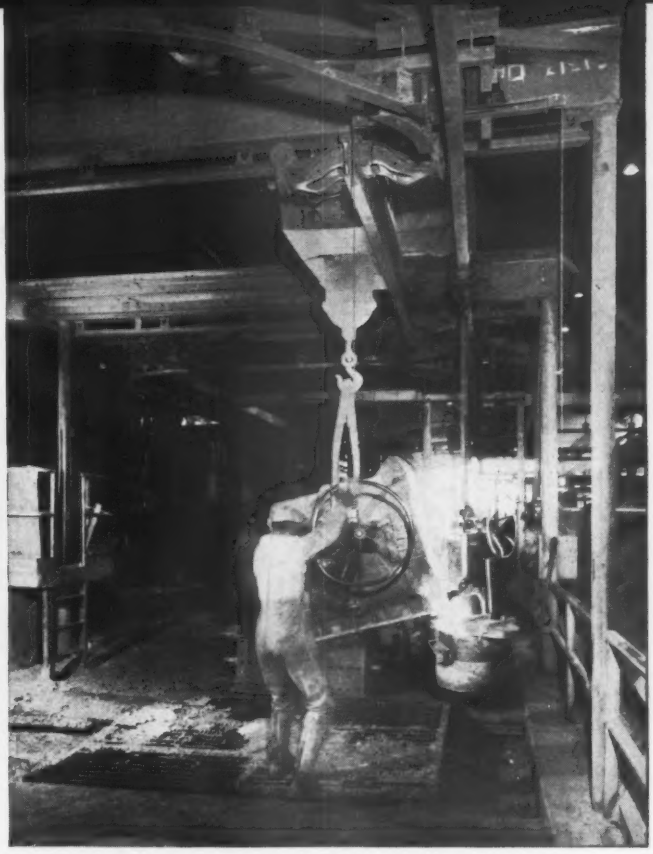
Automatic system lifting 2000 lb. bucket load of core sand blending materials to storage bins above.

Here bucket has reached high position and carrier is unloading at one of eight bins, as selected at starting point. After unloading it returns automatically.





Automatic carrier dumping load of sand at station No. 16, which is supply for sand slinger. After unloading, carrier returns to the sand muller. Only attendant is man stationed at muller.



Transferring a bull ladle of hot metal from an electro melt furnace to a pouring ladle.

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rly Every Materials Handling Requirement

on these pages represent only a fraction of the entire Cleveland Tramrail installation.

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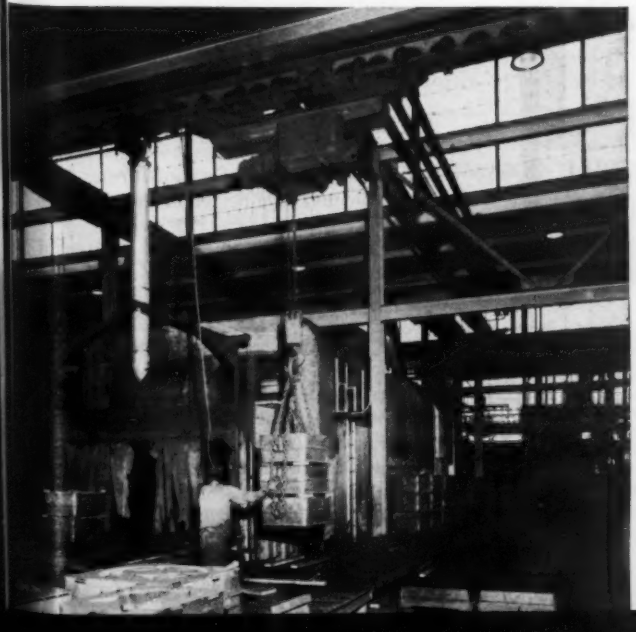
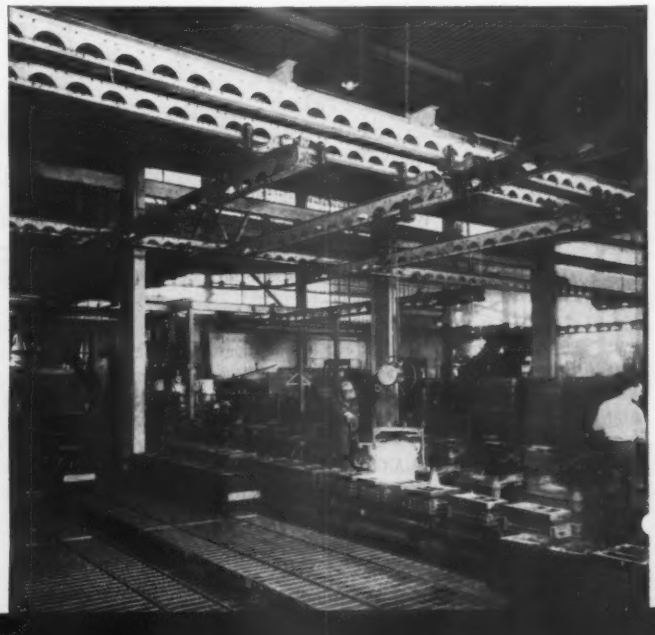
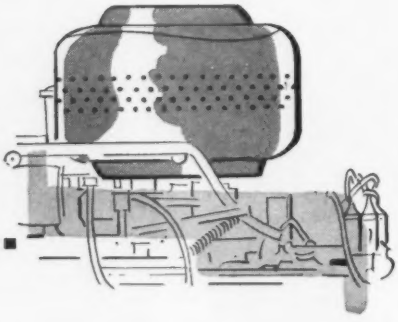
10-ton Cleveland Tramrail crane handles large molds from drying oven to two mold conveyors.



An extensive interlocking crane system serves the light pouring floor. These smooth rolling cranes make pouring fast, safe and easy.



for raisins



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that overload relays be manually reset since this gives the operator a chance to correct difficulty which may have caused the overload before resetting the relay.

The squirrel cage, wound rotor, and synchronous a-c motor all use essentially the same protective devices except that the synchronous motor requires some additional protection for its squirrel cage winding. This is accomplished by a *thermal timing device* which takes the motor off the line if the starting current is maintained in the squirrel cage winding for a set period of time.

The direct current motor has a number of protective devices available. The shunt or compound wound direct current motor is frequently provided with a *field relay* to shut down the motor in the event of losing the shunt field. This prevents the motor from "running away."

Jamming relays are sometimes used on d-c drives where the motor is apt to encounter an occasional excessive load such as might be the case with the bucket shovel. The jam relay operates to cut resistance into the armature circuit whenever a set value of current is exceeded.

Plugging relays and *anti-plugging relays* are frequently used with reversing drives. The plugging relay allows the motor to be reversed while proceeding at full speed in the direction opposite, but it forces all of the accelerating resistance to remain in the armature circuit until the armature current has fallen almost to the zero point so that it will be safe to start acceleration of the motor in the opposite direction. The anti-plugging relay performs the function of actually preventing reversal of the current to the motor until the current falls to a value determined to be safe for reversing the motor.

Low voltage control circuits are becoming more popular, and a preferred way of obtaining this low voltage control is by means of a transformer with its primary connected to the load side of the motor disconnect switch.

Another type of control equipment gaining increasing popularity is the *plug-in type motor control center*. The motor control center groups a quantity of motor control equipment into one location, and provides all of the safety features of the combination starter with the added advantage of great flexibility by simplicity of interchanging starter compartments.[2]

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MORAL: Don't pick up trouble; in every case –
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Solving waste disposal problems assumes increasing importance

PANELIST

R. R. SCHOLAR
Plant Engineer, Stauffer Chemical Co., Richmond, Calif.

THE PROBLEMS associated with waste disposal are not new. But, to a large extent *the problems have assumed increasing importance to plant engineers and managers* because of the steady growth of public pressure on industry and a corresponding realization by industry itself that it, also, has a big stake in the preservation of our natural resources.

In recent years, we have developed an increasing awareness that, in solving these problems, use of sound plant engineering practice can frequently salvage much of the cost by reclaiming product, water, heat, etc. Unfortunately, this is not always the case—in many instances, the cost of scrubbing gases, treating liquid wastes, etc., must be accepted by the industry concerned as an added burden on its operations.

For this reason, many such problems have been ignored and evaded with the result that government agencies at all levels are providing legislation to compel the elimination or abatement of pollution. *The current trend in industry seems to be in the direction of a realistic acceptance of these facts and a corresponding willingness to solve the problems before public resentment is aroused.*

In the discussion of waste problems, a generally accepted breakdown is by character of the waste as solid, gaseous or liquid.

Solid waste disposal becomes a marketing project

Solid waste disposal generally presents relatively few problems. In most cases the material has some commercial value even if only as fill, so we usually wind up with a marketing project rather than a disposal problem.

An interesting illustration of this type of situation was reported in the technical press recently by Hubert Chappie, superintendent of foundry, The National Supply Co., Torrance, Calif. He outlined the steps taken to salvage a previously wasted mold facing sand with considerable savings in both purchase price and disposal space. The total cost of installation was approximately $55,000 and annual savings are approximately $43,000.

Unfortunately, this happy type of situation occurs far more frequently in connection with the disposal of solid wastes than with either liquid or gaseous types. Equally unfortunately, the great majority of waste products seem to be in the latter two categories.

Research on pollution control as important as on new products

Industry is blamed by the public for much of the existing air pollution. The biggest individual clouds of smoke may come from industrial stacks, but in the community as a whole, industry is only one of the many contributors, and not always the major one.

Air pollution may be defined as "the presence in the air of substances put there by the acts of man, in concentrations sufficient to interfere with the comfort, safety or health of man, or with the full use and enjoyment of his property." On the other hand, the air is a natural means of disposing of useless residues, and it should be so used to the fullest extent compatible with public safety, welfare and comfort.

The question then becomes: how much is "too much?" The answer depends on the nature of the air polluting material, the specific effects it produces, and where it is emitted. Thus, a proper appraisal of air pollution must be based on the undesirable effects of pollution at specific locations and times, rather than its mere presence. It is precisely because of this highly subjective nature together with the substantial costs of abatement facilities that air pollution is and will continue to be the most controversial area in the field of waste disposal.

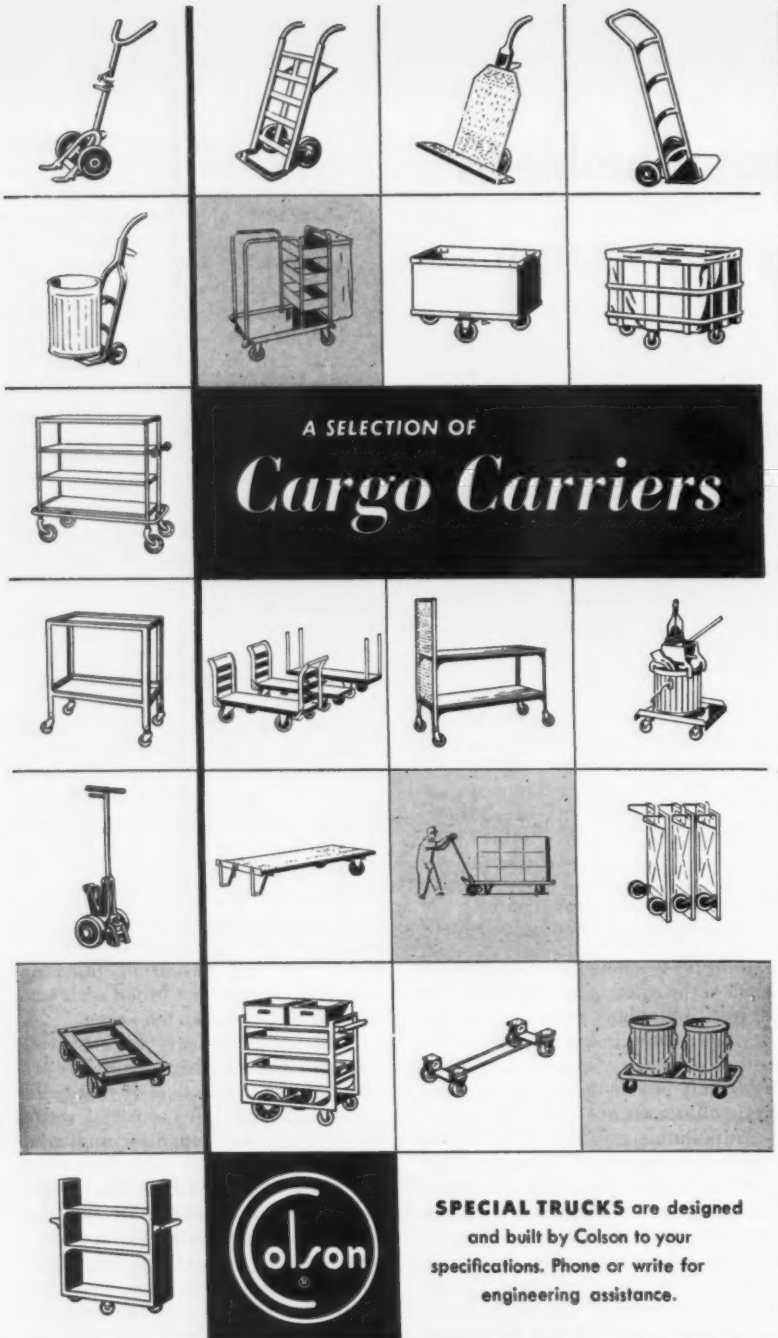
The Manufacturing Chemists Association and other trade associations have endeavored to stimulate concerted industry action by intensive research and educational campaigns. The primary objective of most of these efforts has been to foster a realization on the part of management that successful pollution abatement requires a critical review of all new plants and processes for waste disposal. In the long run, pollution is easier and cheaper to avoid than to cure. In many companies it is considered to be just as much a part of research to develop good methods of controlling contamination as it is to develop new products and processes.

Thorough study needed to solve liquid waste problems

The greatest majority of waste disposal situations involve liquids (and specifically water). As a nation-wide problem water pollution and its associated aspect of water supply are relatively new. Both date from the expansion of manufacturing operations between the two wars, but the problem has really gained prominence only since the end of World War II. Certainly the application of industrial waste treatment on a broad scale goes back little more than ten years.

Obviously, industry is not solely responsible for this treatment program, nor is it practical or reasonable to demand that all industrial wastes be treated. Municipalities and other public agencies must carry their rightful share of this burden. But we recognize the fact that in most areas where stream pollution is already a problem, wastes from industry usually are the main offender. It is in our own interest to see that our water supplies do not become so contaminated that they no longer can serve the legitimate interests of other towns and industries.

Recognizing that this is a problem that must be faced, the next logical step is, "What can be done about it?" It is no secret that waste treatment can be expensive. This expense must be added to the cost of the product and paid for by the ultimate consumer —and no one likes to increase costs in a competitive market. Too often, therefore, all consideration of waste treatment is postponed until the last possible moment. When some sort of action becomes imperative, the plant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. . . QUICK SOLUTIONS EXPENSIVE

engineer is asked to provide a quick solution. "Quick solutions" to waste treatment problems are available, but they frequently prove far more expensive than a well thought-out program.

Two examples will illustrate this point. A new plant in the Los Angeles area originally estimated the total waste discharges at between 20 and 30 mgd. After careful study of possible re-use of water within the plant, the total amount of water discharged to waste was reduced to less than one mdg., with an enormous saving in waste treatment equipment costs.

At another plant, acid was creating a serious pollution problem. A simple study of the process showed that 80% of the loss occurred through pump packing leaks. Using a different pump completely eliminated the waste problem.

Before any decision is made on a waste treatment process, certain basic information should be established. This includes:

1. An examination of the process to see what wastes are being discharged. A considerable amount of profit may be going down the drain.
2. Consideration of process changes that may reduce the waste problem. One plant found that through the simple expedient of changing from a phenolic cleaning compound, waste treatment was eliminated.
3. Investigation of possible water re-use for less critical operations. Remember, water does not wear out.
4. Determination of the actual amounts of water discharged, including the extent and duration of surges. This is checked against the amounts realistically required for efficient operation.
5. A campaign for good plant housekeeping. Leaks and spills are big contributors to pollution problems.
6. Familiarization with local and state requirements on plant waste discharges. Representatives of the control agencies are reasonable men who also want to help solve waste problems.

Once these basic data are known, possible waste treatment processes can be investigated. Since no two problems are exactly alike, even in plants performing the same function, for the greatest efficiencies and economy waste treatment facilities must be tailored to the individual plant they are to serve. One important consideration in the evaluation of any process is its net operating cost. In other words, will the process selected provide any return in the form of product, by-product, water, or heat to help pay part of the waste treatment cost.

Waste treatment problems generally are solved in one of three ways:

1. By removing the nontoxic material from the system.

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2. By changing the toxic material to a nontoxic form.
3. By physically removing the impure material.

Evaporation of highly concentrated wastes is an example of the first method. This is used for sulfite liquor waste and for certain radio-active wastes. High cost of this method makes it impractical for most waste treatment problems.

Municipal sewage treatment is probably the best example of the second method. Pollutional materials in sanitary waste are biologically oxidized to nonobjectionable form. Originally, these same sanitary treatment techniques were attempted for all industrial waste problems, but in modern engineering practice, they are generally used only where they seem directly applicable. Dairy, cannery, laundry, slaughterhouse, packing house, and some fermentation wastes are amenable to biological treatment. Another example of the same method in a nonbiological process is the oxidation of cyanides to carbon dioxide and nitrogen using chlorine.

Most waste treatment problems are solved by the third method—the physical removal of the impure material from the waste stream. This is accomplished in a great many ways, and frequently laboratory or pilot plant tests on the waste solutions will be required to determine what method, or combination of methods, will give the desired results. Principal methods and their characteristics are: screens for large solids removal, sedimentation units, mechanical flocculation units, air flocculation units, ion exchangers, filters, and neutralization.

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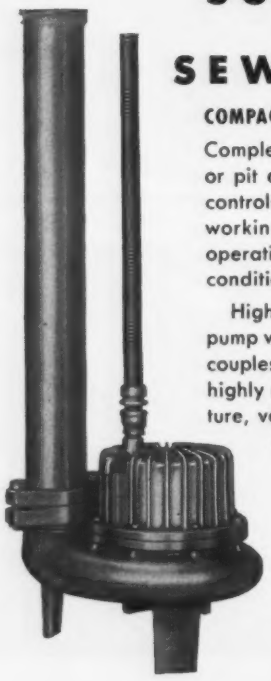

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Individual know-how, cooperation can build top maintenance team

PANELIST

D. W. EGELSTON
Maintenance Engineer, Marchant Calculators, Oakland, Calif.

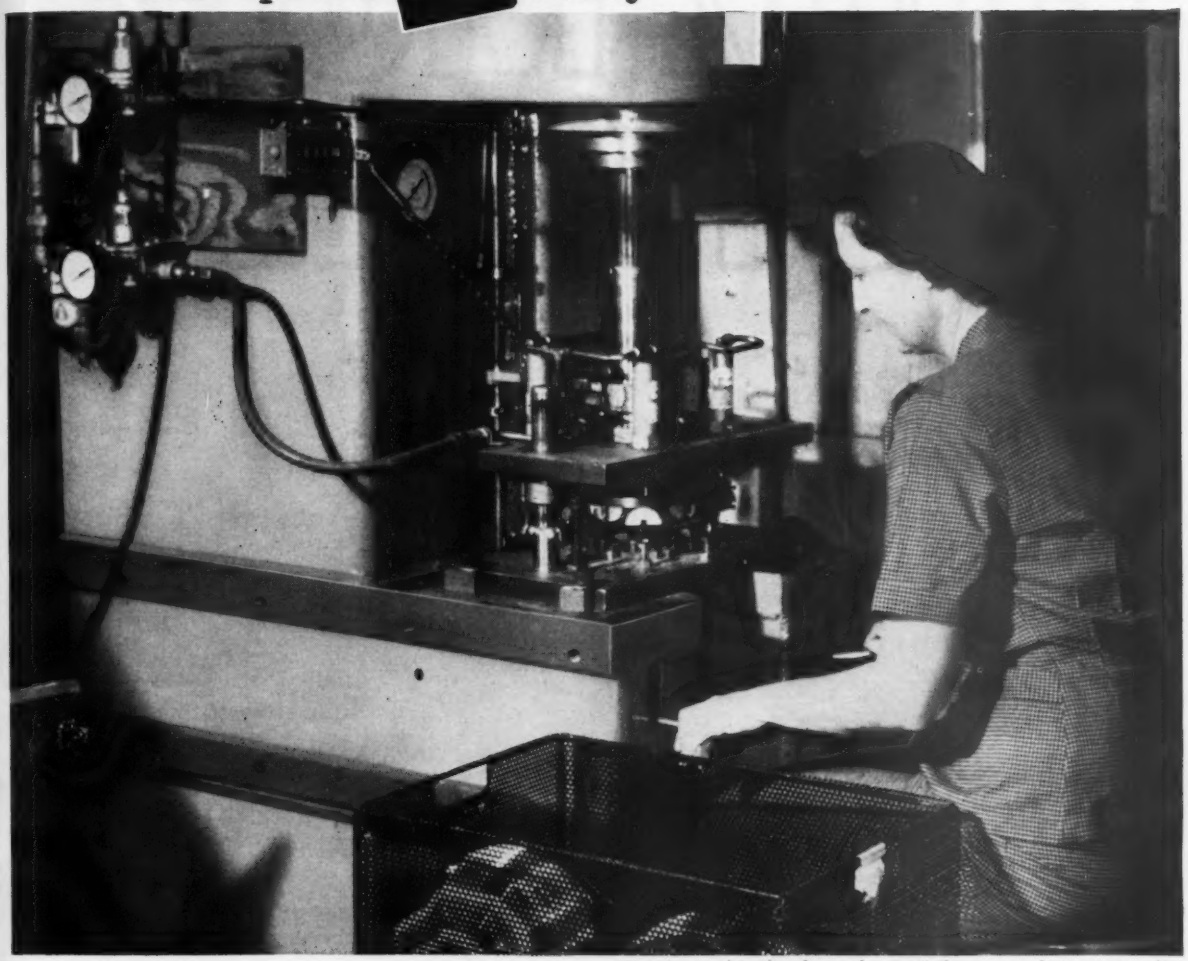
OUR MAINTENANCE DEPARTMENT consists of 20 men, who—though they are capable of handling any maintenance problem that may arise—each depends also upon the cooperation and teamwork of his fellow workers.

This may sound contradictory, but actually it has been only through the combined and concentrated efforts of all members of our maintenance team that each individual has the know-how to proceed on his own.

While most of our men are specialists within their own fields, each man benefits from the knowledge and experience of others, and all operate together as a well-organized unit.

To build this maintenance unit, we needed "raw material"—men with background and training in electrical, mechanical and utility engineering. Men with these basic requirements

A Multipress case study



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MULTIPRESS forms 1000 parts hourly for toy maker

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Datalog MUL-2 describes in detail Mattel's use of Multipress. For your copy, write Denison Engineering Division, American Brake Shoe Co., 1184 Dublin Road, Columbus 16, Ohio.

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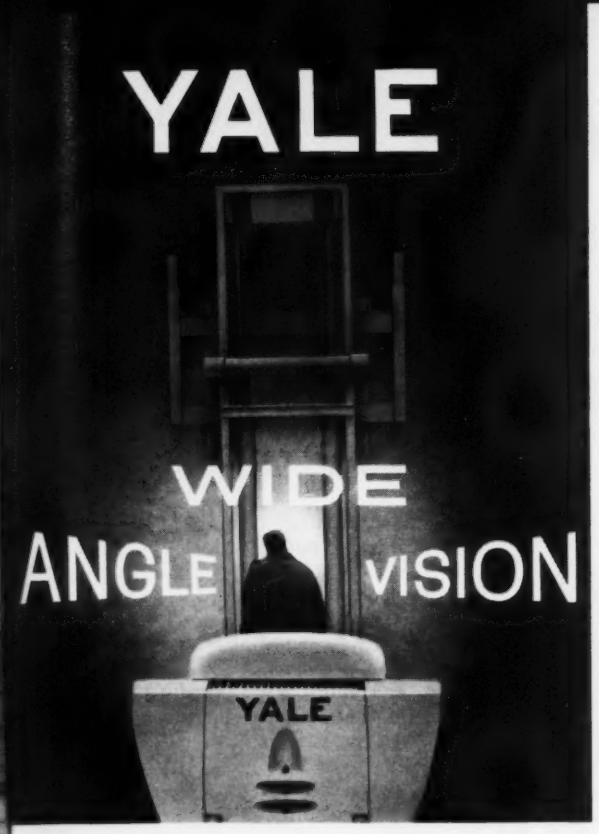

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- All controls conveniently located.
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- Designed for a complete set of attachments, engineered for minimum loss distance.

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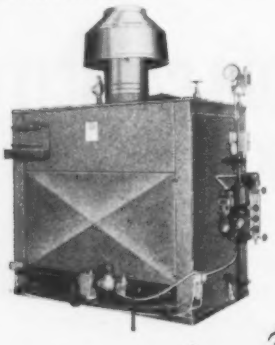

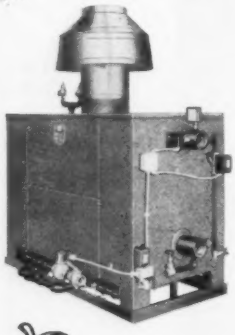

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weren't hard to find. But a builder needs tools, and our most important implement proved to be "human engineering."

All of us are familiar with the term "preventive maintenance." Preventive maintenance engineering anticipates the weakness of a certain machine and enables the potential fault to be corrected before any damage occurs.

Preventive "human engineering"

Preventive "human engineering" foresees and forestalls similar weaknesses or trouble spots in the human element involved.

At all times we must keep in mind that we are dealing with people as well as machines. Unless sufficient time and effort are devoted to both, the best organized department will fall flat on its face and cease to function effectively.

And besides seeing that our men know all essential parts of their job, we must understand our men. To understand them, and to make ourselves understood by them, we must have a personal knowledge of each man. We talk to them individually—gain their confidence—draw them out, and learn their basic personalities, their interests along other lines, as well as their knowledge and skills.

This is a much bigger job than mastering the technicalities, but it is invaluable in co-ordinating a well-balanced team. The results have been gratifying and are paying big dividends.

"Cross-training" personnel

We also see that men do not become too specialized in their work but have an opportunity to learn other parts of the maintenance program. We have found that informal group meetings are very effective in this respect. These meetings serve to better acquaint the men with one another, and the work of others, and give them a broader understanding of our overall maintenance program. Thus, the men learn from each other and become "cross-trained."

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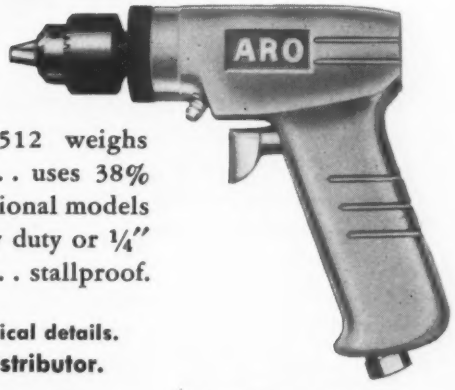

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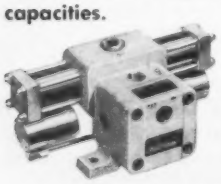

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. . .SOLVE PERSONALITY PROBLEM

routine maintenance program proceeds without disruption, and men are always available for other emergency requirements.

Our cross-training program has solved another problem for us—that of swing shift coverage. We operate only certain production departments on the swing shift. One cross-trained man can assume this maintenance responsibility, spotting and correcting any trouble in the plant—electrical, mechanical or otherwise. One man handles the job formerly requiring three or four. Down time and overtime are at a minimum. Consider the savings right there!

Solving personality problems

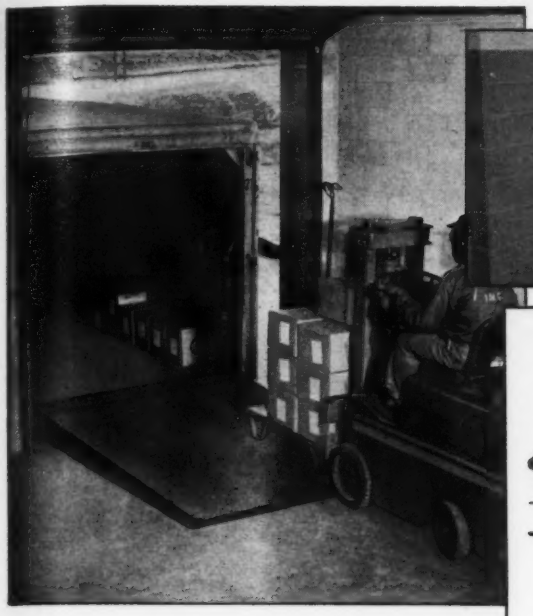
Personality problems are one of the most common obstacles in the path of effective teamwork. When these arose in our group the individuals were called together over a cup of coffee and their differences brought out into the open, tactfully and honestly, and without any attempt at criticism or placing the blame.

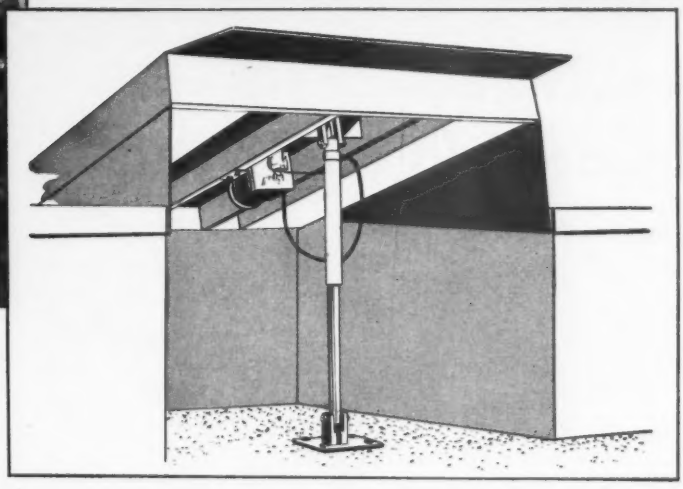
Larger dissenting groups were brought together in the same manner, and it was impressed upon all these people that not only would they benefit job-wise through our expanded cross-training program, but that they would derive personal benefit as well.

All this was not accomplished overnight, but almost immediate results were observed. Morale improved perceptibly. Some of our leadermen, for instance, discovered without rancor that unintentionally they had been upsetting or antagonizing some of their men, or other leadermen. By the same process, workers came to see that quite often a personality trait, rather than lack of skill, retarded their normal advancement.

As a result, these people are deriving more personal pleasure from their work. Latent skills are being tapped and utilized, and a free exchange of ideas and information has developed. Not only are these people better qualified maintenance men, they are also happier, better adjusted individuals, both on the job and away. It is a form of "group therapy" that is spreading throughout the organization.

A system of "pre-planning" has been established successfully. Routine maintenance is taken care of as it occurs, and job orders are planned ahead, with the men assuming complete responsibility for follow-through. This procedure has been referred to





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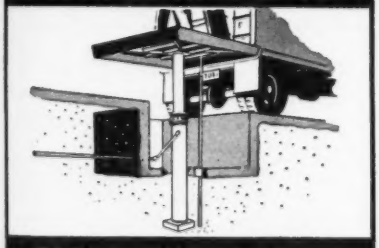

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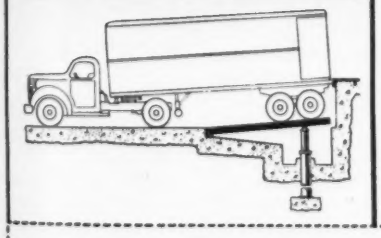

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. . . for more details, circle No. 54 on Reader Service Postcard

as "management by exception." You know what your men can do—give them the responsibility and authority to go ahead.

Briefly, this is our formula for getting maintenance people to work as a team:

1. Keep uppermost in mind that you are working first with people, who in turn work with the machines.
2. Keep yourself and your men well-informed.
3. Supplement their specialized training with "cross-training," and training in operating techniques.
4. Let them know that you have confidence in them, and that they can rely on you.

The basic ingredients are simple. The task of combining them in the proper proportions is a little more complex, but with the right approach, and the sympathetic application of "human engineering," any maintenance department can be developed into a well-balanced, co-ordinated and highly efficient team.[1]

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Model 1500 idlers are made in our Los Angeles plant...designed and built for Western needs. For the complete story, send for your copy of Bulletin No. 55-77. CHAIN Belt Company, 7601 Telegraph Rd., Los Angeles 22, Calif.; 2940 Seventh St., Berkeley 10, Calif.; 2310 N.W. 24th Ave., Portland 10, Ore.; 2425 Airport Way, Seattle 4, Wash.

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Planning holds key to efficiency in maintenance work

PANELIST

G. S. FAIRHURST

Assistant Chief Engineer, C & H Sugar Refining Corp. Crockett, Calif.

WE HAVE about 300 maintenance personnel for our plant of 1,700. Some 40 of these are assigned to on-the-spot maintenance with the production staff, and the rest are available for general maintenance and plant improvement work. Our plant operates for 10 consecutive days, with a four-day shutdown. Unfortunately, the shutdown always includes a Saturday and Sunday which means overtime pay for maintenance work.

In *planning for efficiency*, we believe the most important requirement is the selection of good maintenance people. We want people who are good *team* workers and craftsmen. We try to select craft supervisory material from the ranks, if possible—and then allow them to function as supervisors with a minimum of restriction.

And we try to select foremen who know their business and will keep abreast of changes, and who will fuse their men into an effective and smooth working team.

Efficiency in maintenance is largely dependent upon experience in past practice available through accurately kept records. *The best foresight is that which is developed through intelligent and accurate hindsight.*

However, we keep paper work to an absolute minimum and concentrate on placing as much responsibility on the "front line" by giving each foreman as much maintenance responsibility as he demonstrates he can assume. Preventive maintenance can be made to approach 100% effectiveness in critical areas by the use of station mechanics—craftsmen who have tuned their machines under production conditions and who know all the equipment's eccentricities. *(turn to p. 80)*

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. . . ADVANCE PLANNING WINS

In *planning for coordination with production*, it becomes necessary to remove major equipment from process or production. We carefully weigh the cost of production loss against maintenance cost, and sometimes work our men on shifts around the clock. While we try to avoid overtime, it's worthwhile if it will offset production loss.

Advance planning is essential in a good maintenance program, and we have found that a pre-shutdown meeting has proven valuable. Our foremen assemble two days before the shutdown period begins, to list the work that must be performed and can be planned, discuss work which requires the efforts of more than one craft, and schedule each craft in required force at the proper time for *maximum efficiency* and *minimum interference*. Work orders are issued to all concerned so that maintenance work can begin immediately after shutdown.

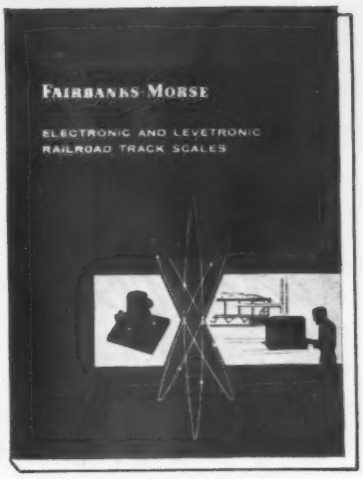
In *planning the maintenance budget*, each foreman prepares a yearly estimate for labor and material in his area. Accounting records from previous years are used in making this budget. These budgets are reviewed, questioned and discussed before being approved.

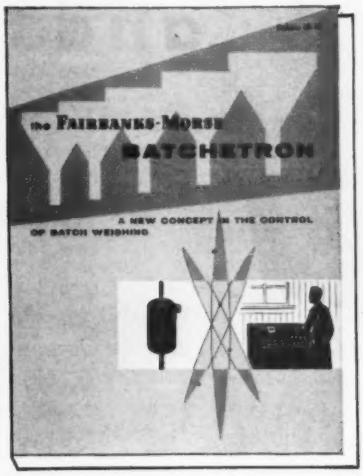
In *scheduling budgeted maintenance work*, we have found the simplest of all to schedule is routine station or area work. Non-routine work resulting from requests issued by other departments is scheduled daily with priorities given by the master mechanic, according to need.

Periodic overhaul of major equipment is scheduled months in advance of actual work to fit in with production schedules developed as a result of anticipated sales. We are able to give top priority to emergency breakdown repair work because we keep manpower on roll somewhat in excess of our normal maintenance requirements. The excess normally is used for plant improvement work.

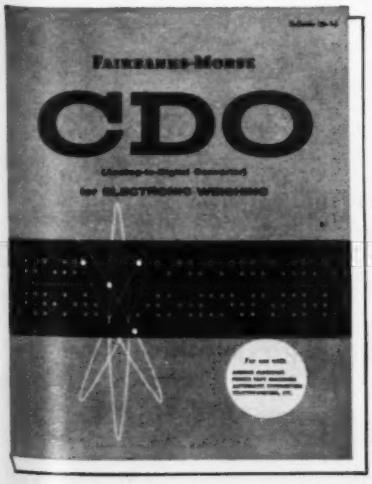
In *planning capital improvements*, we have a fairly accurate forecast to work with, as department heads must submit requests for capital improvements many months in advance.

Quarterly schedules are made in advance of plant improvement work. *A backlog of improvement work is maintained as a healthy condition to obtain an efficient output from the available personnel by leveling the peaks and valleys.*





The story of Fairbanks-Morse Electronic Scales in seven volumes



Just off the press—seven new bulletins about Fairbanks-Morse electronic weighing and batching machinery. The covers pretty well identify themselves as illustrated above, except that you might not know that EPC is a completely automatic batching system that operates from punch cards . . . or that Batchetron is a slightly less automatic batcher with quick provision for manual preset of the cycle . . . or that CDO is a "read-out" instrument that will translate the weight message of any of the other six into the language "spoken" by automatic typewriters and automatic adding machines and automatic tape punches.

Write today for one or more of the new bulletins on Fairbanks-Morse electronic weighing and batching. Fairbanks, Morse & Co., Scale Division, Dept. WI-6, 600 South Michigan Avenue, Chicago 5, Illinois.

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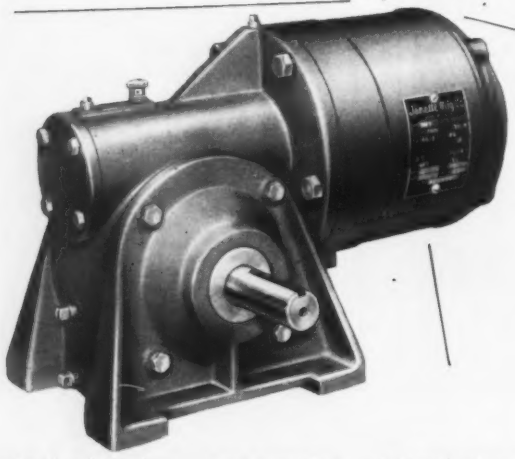
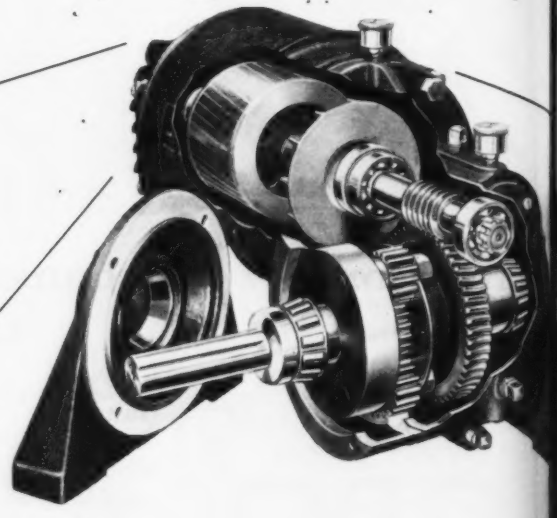
One touch of genius . . .

by the design engineer

and . . .





Production lines hum—transportation and distribution move fast to keep up with the pace of sales.

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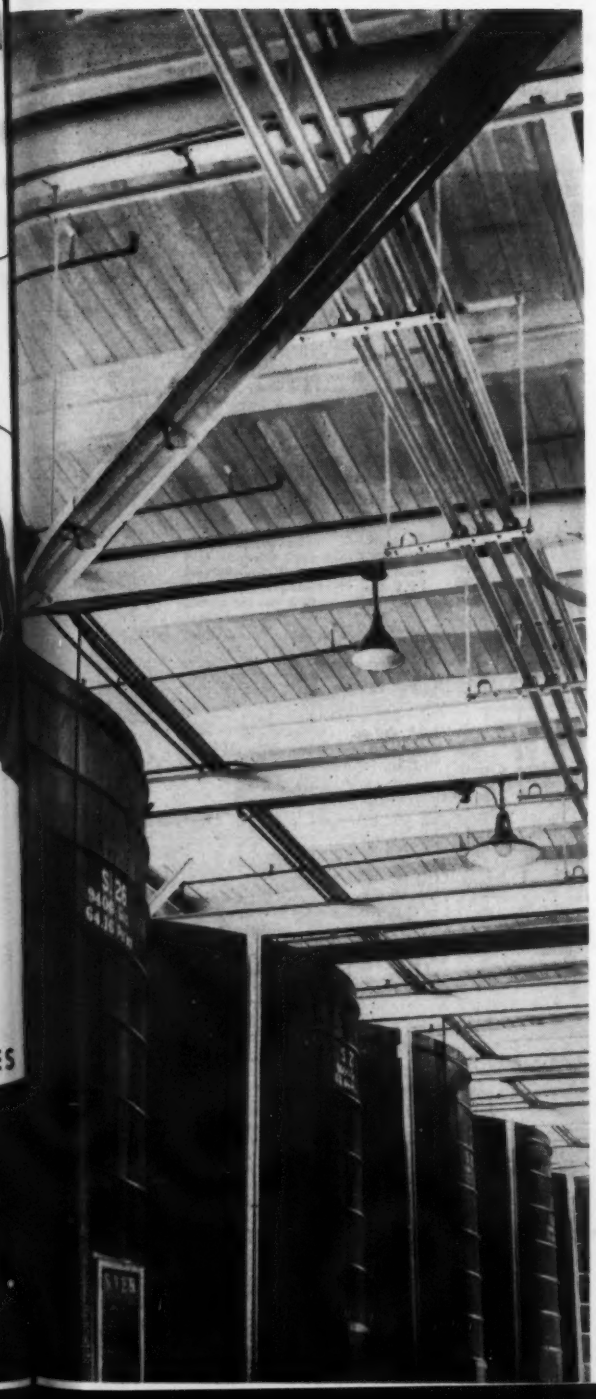
A Special Western Industry Report

How, When, Where to use . . .

PLASTIC PIPE



DO YOU realize the rewards that can be *yours* —$avings in time and money—if you explore all the possibilities of using plastic pipe in *your plant?*

Yes, as fascinating as the potentials of plastic pipe, so are the discoveries of how it can be used to advantage. But, as yet, not many Western plants have profited by the use of plastic pipe, nor do they know much about the subject.

That's why WESTERN INDUSTRY editors spent many weeks in the field, talking to plastic pipe manufacturers, dealers, and plant managers who are using plastic pipe.

Our findings are detailed on the following pages . . . types of plastic used in pipe, advantages and disadvantages of plastic pipe, how it can be used in your plant, how to install it, and how to make your selection of the proper pipe and Western supplier.

Consider our report as your map to discovering how plastic pipe can be used in your plant . . . and how it can bring you rewards—$avings in *time* and *money*.

INSIDE YOUR PLANT—Plastic pipe can be put to many uses, as shown in this photo of a winery. The pipe is two-inch tenite butyrate plastic, which has been used for over eight years to carry wine from the storage tanks to bottling room.

OUTSIDE YOUR PLANT—Highly acidic bagasse water, resulting from the processing of sisal leaves for fiber, is carried to a disposal pit through a pipeline of corrosion-resistant tenite butyrate plastic.

Understanding and working with plastic pipe . . .

PLASTIC PIPE—a relative infant in the piping field—is growing faster than Jack's beanstalk.

Where production of plastic pipe was a scant 2,600 net tons in 1950, it is edging toward 100,000,000 lb. a year. This is because more and more industrial firms are finding that plastic pipe can reap real savings in replacing and improving on other types of pipe and installing new systems.

. And because of the ever brightening prospects of the materials that go into manufacturing plastic pipe, its good properties are blotting out some of its limitations.

Now, just what is plastic pipe?

Plastic pipe is made of thermoplastic materials (polyethylene, polyvinyl chloride, vinylidene chloride, etc.) or thermosetting (Bakelite, Formica, polyesters etc.). Just as there are many species of "metal" pipe, so are there many kinds of plastic pipe—each with its own properties and applications.

The chart below shows some of the more common types of plastic pipe, together with its characteristics, sizes, fittings to be used, advantages, limitations, best applications and burst pressures.

Some of the other materials used in plastic pipe are Epoxy Resin, Furan, Phenolic, Polyfluorocarbon, Penton, and others that are being developed. (see "New Horizons" section later in the article).

Let's analyze the . . . **Advantages of Plastic Pipe.** Generally, plastic pipe has the following advantages:

1. Corrosion resistance

	APPEARANCE	ODOR	TEMP. RANGE, F (LOW & HIGH)	PIPE SIZES (INCHES)	LENGTHS (FEET)	TUBING SIZES (INCHES)
Polyethylene	Waxy feeling Any color, usually black		—50, +125.	⅛-6", OD dimensions are I.P.S.	Coils up to 400'	¼-1"
Cellulose Acetate Butyrate	Transparent clear, or glossy black-shiny	Sour odor	—20, +130.	⅛-6", OD dimensions are I.P.S.	20'	¼-1"
Polyvinyl Chloride (Unplasticized) PVC Normal impact	Industrial dark grey	Slightly distinctive odor	+10, +140.	⅛-6", OD dimensions are I.P.S.	20'	1/32-⅛"
High impact						
Vinylidene Chloride	Black-shiny		0, +170.	⅛-6", OD dimensions are I.P.S.	10'	⅛-¾"
Rubber—Styrene Copolymer	Industrial light grey or black		—20, +170.	⅛-6", OD dimensions are I.P.S.	20'	None
Polyester Reinforced with Glass Fiber	Greenish color Glass fibers visible in resin		—90, +175.	2-12", OD dimensions are nominal	20'	None

PHYSICAL CHARACTERISTICS OF SIX TYPES OF PLASTIC PIPE (AT 70 F.).

2. Ease and economy of installation
3. Light weight
4. High flow factor
5. Greatly reduced tendency to scale or wall cake
6. Non-conductor of electricity
7. Very low conductor of heat

We'll discuss each of these briefly.

Corrosion resistance—Many types of plastic pipe (notably polyethylene) are non-toxic and corrosion resistant to most liquids and chemicals. Polyethylene and polyvinyl chloride (PVC) have proven excellent for water, acid and alkalis; PVC for gas lines, sour crude oil, waxing conditions, etc. Chemical plants, food and beverage industries have made good use of rubber styrene copolymer . . . and other types of plastic pipe have proven satisfactory under certain conditions. Plastic pipe is immune to soil and atmospheric conditions.

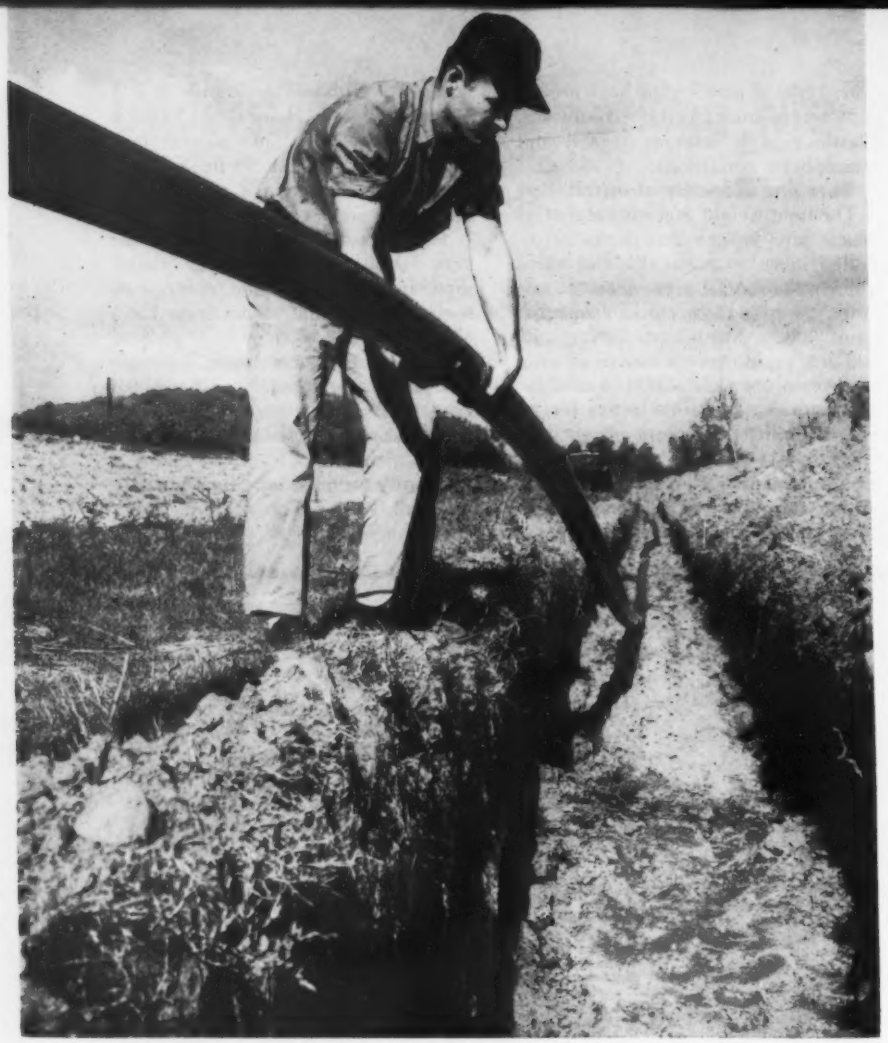
Ease and economy of installation—The light weight and workability of plastic pipe is such that it can be installed more economically and more quickly than metal pipe. (See "Installation" section). In outdoor installations—where pipe is buried—it can be laid at a rapid rate—a case in point is where two men laid 4,000 ft. of 2-in. pipe with cement joints in five hours. The flexibility of the pipe allows it to follow twists and bends or variations in ground level—that would require special fittings for laying metal pipe under the same conditions.

Light weight—Plastic pipe is 7 to 13 times lighter than steel. Thus, a hundred feet of 2-in. polyethylene pipe weighs less than 50 lb. You can readily see the savings in shipping, handling and installation.

High flow factor—Because of the very smooth inner walls of plastic pipe, internal friction is reduced to such an extent that allows from 15 to 40% greater flow than steel pipe of the same size. In most cases, a plastic pipe of smaller diameter will replace a metal line. It's possible to install a new plastic line by telescoping it into an old metal line.

Greatly reduced tendency to scale or wall cake—The factors above (smoothness of wall, greater flow

PIPE FITTINGS: TYPE USED RANGE OF SIZES—	ADVANTAGES	LIMITATIONS	BEST APPLICATIONS	BURST PRESSURE AT 70° F PSI.
ert type with clamps ut-weld ctaulic couplings ½-2"	Low price Inexpensive to install Flexible Long lengths available High impact strength Non-toxic Abrasive-resistant High chemical resistance Lightweight	Pressure and temperature range is low Soluble in oil Cold flow property Direct sunlight will shorten life Type and method of connecting	Low press. water service Low press. and low temp. corrosive solutions Lines to be moved Drainage or waste lines Electrical conduit Jet wells	½"—450 ¾"—360 1"—275 1 ¼"—250 1 ½"—210 2"—180 2½"—165 3"—160 4"—160 6"—115
¼-1" p-sleeve type with solvent cement sser coupling ½-6"	Low price Low friction loss Easy and inexpensive to install Transparent Scale-resistant Lightweight Unaffected by electrolysis	Low chemical resistance Low strength Direct sunlight will shorten life High rate of expansion	Sour crude oil Gas lines Water lines (unchlorinated) Long pipelines Waxing conditions Waste water lines Pipelines subject to scaling or electrolysis	½"—700 ¾"—625 1"—600 1 ¼"—580 1 ½"—560 2"—500 3"—400 4"—360 6"—350
/32-½" p-sleeve type with solvent cement ½-6" readed ½-4"	High tensile strength High pressure rating High corrosion resistance Sunlight has slight effect Easy and inexpensive to install Simple type of fittings Scale-resistant High impact strength	Low impact Temperature range is low Reduced chemical resistance Low temperature Reduced tensile	High press. lines Chemically corrosive service Sour crude oil Waste water lines Waxing conditions Water lines (chlorinated) Pipelines subject to scaling or electrolysis	STD. (SCH-40) / LIGHT WALL (SCH-20) ½"—1400 / ½"—600 ¾"—1150 / ¾"—550 1"—1100 / 1"—500 1 ¼"—900 / 1 ¼"—475 1 ½"—840 / 1 ½"—475 2"—700 / 2"—460 3"—650 / 3"—400 4"—550 / 4"—360
⅛-¾" readed or ut-weld ½-2"	High corrosion resistance Good range of threaded fittings	Low impact strength High-priced Direct sunlight will shorten life	Highly corrosive service Compact piping installations	½"—1300 ¾"—1060 1"—970 1 ¼"—820 1 ½"—740 2"—620 2½"—570 3"—510 4"—460 6"—400
None readed; vent cement ½-6"	High impact strength Good range of threaded fittings Low expansion Resistance to abrasion High corrosion resistance Good temperature range Non-contaminating Scale-resistant Lightweight	Direct sunlight will shorten life	Highly corrosive service Compact piping installations Food and beverage lines General purpose usage	STD. (SCH-40) / XH (SCH-80) / LT. WT. ½"—750 / ¼"—1500 / ½"—700 ¾"—750 / ⅜"—1500 / ¾"—650 1"—625 / ½"—1500 / 1"—600 1 ¼"—500 / ¾"—1500 / 1 ¼"—500 1 ½"—450 / 1"—1250 / 1 ½"—425 2"—375 / 1 ¼"—1000 / 2"—400 3"—300 / 1 ½"—875 / 3"—350 4"—300 / 2"—750 / 4"—350 6"—250 / 3"—625 / 6"—300 4"—625 6"—500
None in wrap ister coupling taulic coupling -12" readed -4"	Good temperature range High pressure rating High structural strength No cold flow Non-toxic Large sizes available High corrosion resistance Low friction loss Sunlight does not harm	Not available in small sizes Short range of fittings Special connecting steps necessary	Large diameter lines High temperature lines Corrosive service High press. lines Waste water lines	4"—1000 6"—1000 8"—1000 10"—1000 NOTE: ALL PRESSURE RATINGS ARE REDUCED IN INVERSE PROPORTION TO TEMPERATURE INCREASES.



MAJOR OIL PRODUCERS are successfully using plastic pipe for sour crude oil and salt-water disposal lines where corrosion-resistant pipe is needed. This pipe delivers approximately 40% more fluid than clean steel pipe of the same diameter.

rate) reduce the tendency to scale or wall cake. Maintenance of lines is greatly reduced and a more even flow is assured.

Non-conductor of electricity—Being a non-conductor of electricity, plastic pipe is immune to electrolytic or galvanic types of corrosion.

Very low conductor of heat—"Sweating" of pipes is no problem because plastic is a very low conductor of heat or cold. However, this does not mean it has high temperature resistance.

This leads us into the . . . **Disadvantages of Plastic Pipe. These are:**

1. Low temperature resistance
2. Low pressure resistance
3. Low physical and impact strength
4. Tendency to "cold flow" (and in some cases) deterioration in sunlight

Temperature—Low temperature tolerance is one of the chief limiting factors of the use of plastic pipe. While most plastic pipe materials have top limits from 120 deg. F. to 180 deg. F., there are types being developed that will withstand temperatures up to 500 deg. However, great care must be used in determining whether the pipe will withstand your maximum temperature requirements.

Pressure—Bursting pressure for plastic pipe is much lower than for steel. For instance, 1-in. extra-heavy normal impact polyvinyl chloride plastic pipe has a bursting pressure around 1,500 psi. compared with about 8,000 psi. for the same size standard butt-welded steel pipe. And, remember that good practice for plastics calls for safe working pressure not to exceed one-fifth of the bursting strength. Take note, too, that bursting pressures are reduced as the working temperature increases.

Physical and impact strength—Most plastics have a low impact strength, with the exception of polyethylene, rubber styrene and high impact PVC. Therefore, most pipes should be protected in some way against physical abuse (whether buried or installed in the open). Also, any installation that would produce line hammer could wreck certain types of plastic pipe.

Sagging and sunlight—Unless properly supported, some plastic lines have a tendency to "cold flow" or sag. Also, ultra violet light (sunlight) can cause deterioration in some plastic lines.

BALANCING the good with the bad, you can arrive at these conclusions: Plastic pipe can be used for most low temperature liquid and gas lines in your plant—especially under these conditions:

1. When you want to lick corrosion—corrosion from within or without the line or from electrolytic causes.
2. When plastic is less expensive than the material presently used.
3. When ease of installation will result in savings greater than the extra cost of the material.
4. To eliminate wall cake, scaling or tuberculation problems.
5. To eliminate contamination in piping requiring maximum purity.

And—assuming that you stay within temperature, pressure and corrosive limits—you can use plastic pipe in any of the following ways:

water lines—drinking, process
chemical—plating, process lines of all kinds
waste water—water contaminated with acids, alkalis and salts
electrical conduit—plastic tubing and pipe is available for all diameter lines
sour crude oil—petroleum companies are extensive users of plastic pipe
gas lines—more than 2,000,000 feet of plastic pipe is already used by this industry
compact piping installations—plastic pipe is ideal for intricate, complex systems
food and beverages—non-toxic qualities of plastic maintain high purity
vents—ideal for all types of gases
large diameter systems—ease of handling and low installation cost pay off in these applicaitons

Plastic pipe is used in the production of these products and in these services:

aircraft
appliances
automotive
batteries
beverages
bleaches
bottle washing
cellophane
chemical
chlorine metering devices
coal, coke
condensers
conveyors
pharmaceuticals
phonograph records
photographic film
plastics
pumping supplies
pulp
pumps
radios
radio tubes
railroad cars
rayon
refrigerators
screw machine products

electric motors, equipment	screws
farm equipment	seed
fertilizer	shoes
filters	shutters (metal)
food mixers	soap, detergent
foods	spark plugs
foundry equipment	starch
fuel, gas, oil	textiles (bleaching)
glass	thread
home permanents	TV tubes
ice	umbrellas
insecticides	wallpaper
lamp bulbs	washing machines
leather machinery	water treating equip., service
leather (tanneries)	wire, insulated
metal	woolens
metal cleaning equipment	zippers
oil filters	laundries
oils, fats	municipalities
paints	plating
paper	railroads
paper machinery	sewage disposal
pens	water treatment
	wineries

The above applications cover a lot of ground. You can get more ideas by looking at the table and by consulting with a pipe supplier.

Make this a cardinal rule: *Always consider the use of plastic pipe when installing new piping in your plant!*

A note on cost of plastic pipe: Plastic pipe compares favorably with metal pipe . . . and new production techniques and wider use are helping bring the price down. Also, when you figure longer life and savings on installation (in some cases 75% less than with metal pipe) plastic pipe can be a real buy!

This brings us to . . . **Installation of Plastic Pipe**

Installation of plastic pipe is fast, easy and less expensive than other pipe. Here are some of the installation techniques for plastic pipe:

1. Cutting—is best accomplished with a hack saw or power saw. Fine tooth blades with no set give best results. Blade type cutters are recommended over rotary pipe cutters.

2. Threading—is usually restricted to schedule 80 or above. Standard pipe threading equipment can be used. A tapered guide sleeve should be tapped into the end (or a plug) to prevent the die from distorting and digging into pipe wall (most important with thin wall pipe). Canvas should be wrapped around pipe to guard against marring by the vise. Dies should be clean and sharp. No lubricant is necessary, but it may be beneficial in washing away cuttings.

3. Solvent welding—is one of the fast, easy ways of welding joints. It should be used only on permanent installations. Ends of pipe being fitted should be cut square and smooth. Solvent cement is applied with a paint brush to both ends of a pipe and then they should be pressed home into a fitting with a slight twisting motion. Pipe should be held a moment until initial set takes place. Full strength of set takes place in about 24 hours, but pressure may be applied within 3 to 4 hours.

COMPLETE PLASTIC PIPE and plastic coupling installation on a plastic injection molding machine at Sloane Mfg. Co., Sun Valley, Calif. Note transparent plastic valve bodies which make it possible to "see" whether anything is flowing through pipes.

4. Back welding—is done by the hot gas technique, using welding rod of the same material and hot gas welding equipment commercially available.

5. Bending—can be accomplished by heating pipe in a hot air oven, flameless (hot air) blow torch or hot oil and bending around form of proper radius. Flattening can be avoided by use of regular pipe bending form or filling pipe with sand or coil spring.

6. Assembly—strap wrenches should be used to prevent marring. Joints should not be tightened so they are forced. A pipe compound is recommended on threaded connections.

7. Supports—Supports should allow for contraction and expansion of plastic pipe (in some cases 7 times that of steel). Overhead lines are best supported by an angle iron trough or ordinary strap type hangers, spaced 2 to 3 times as often as steel. Warm lines should be supported continuously. All pipe should be hung so that it can move independently of the supporting members. "Snaking" of buried lines will take care of this expansion problem.

8. Fittings—if the lack of proper fittings was a deterrent to the use of plastic pipe in the early days, this problem is fast being erased. Leading manufacturers of valves and fittings have grown tremendously to supply the market with necessary fittings. However, it would be wise to make sure of the availability of proper fittings for your applications.

9. Joining other lines—fittings are available to join plastic pipe with metal or transite lines.

Brighter horizons for plastic pipe . . .

BRIGHTER prospects and expanding horizons are forecast for plastic pipe, as new materials, processes and more exact standards are blotting out limitations.

New material—A glass-fiber reinforced pipe has been developed that will retain strength characteristics up to 230 deg. F. There is a special asbestos-reinforced formaldehyde type good for temperatures over 400 deg. F. and a new fluorocarbon plastic laminated pipe that is reported to have corrosion-proof properties at temperatures from minus 100 deg. F. to plus 500 deg. F. Republic Steel Corp. has produced a plastic coated steel pipe that combines the best properties of both steel and plastic pipe.

Hercules Powder Co. of Delaware has developed a new molding powder called "Penton." This is a new thermoplastic polymer that has a combination of greatly improved electrical and chemical-resistance properties that can be molded in ordinary injection and extrusion equipment.

New processes—An irradiation and a new pressure process for polyethylene mark this as blazing a new frontier in plastics. Commercial production of a new type of low pressure polyethylene plastic has been started by the Sement-Solvay division of Allied Chemical & Dye Corp.

Pipe from this material is being produced by Orangeburg Manufacturing Co. of Orangeburg, N. Y. (Western plant in Newark, Calif.). This new pipe is asserted to have much higher burst strength, higher heat resistance, and no cracking under stress. It is also reported to have higher chemical resistance than older types of polyethylene.

Exact standards—As of April 15, 1957, the U. S. Dept. of Commerce issued new commercial standards for flexible polyethylene plastic pipe. One of the major revisions in this commercial standard is the new requirement that "all pipes shall meet the specifications of the National Sanitation Foundation."

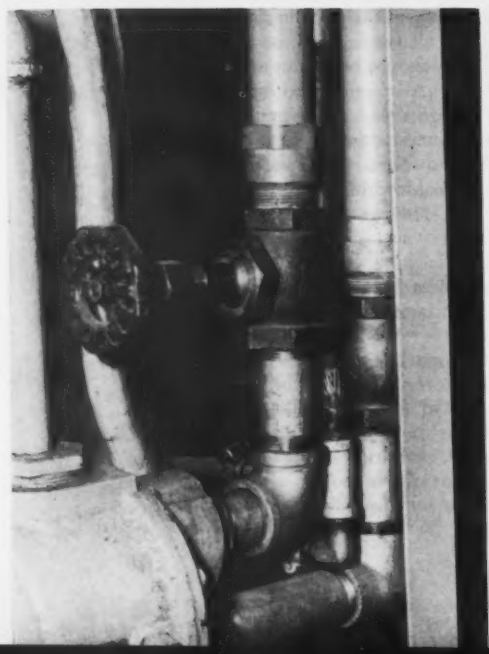
Other purposes of this revised standard are "to establish on a national basis standard dimensions and certain significant quality requirements for black, flexible polyethylene plastic pipe for the information of producers, distributors and users, and to promote understanding between buyer and sellers."

The Society of Plastics Industry has numerous active committees engaged in testing material and setting up standards for all types of plastic pipe and fittings.

And here in the West . . . a Pacific Coast section of the Thermoplastic Pipe Division has been formed for establishing standards, good trade practices and promotion.

Officers are: president—*William Hess*, Plastic Pipe & Tube, Santa Barbara, Calif.; vice chairman—*Harold Dague*, American Plastic Pipe Corp., Paramount, Calif.; secretary—*Ted R. Stevenson*, Sloane Manufacturing Co., Sun Valley, Calif.

OUR SPECIAL THANKS to the many manufacturers and users of plastic pipe who supplied us with information . . . and to **Robert E. Deshon,** assistant manager, northern division of The Republic Supply Co. of Calif.; and **Ted R. Stevenson,** general sales manager, Sloane Mfg. Co., who previewed the article.



TOP—Note the very small steel strap pipe hangers used to support this maze of plastic pipe overhead plumbing in a Western plant. **LEFT**—Junctions between plastic piping and iron piping, using plastic pipe fittings. **RIGHT**—Plastic pipe and a plastic fitting were used to tap this lead to a water sprinkling system directly from a steel tap that was already installed.

Finding and working with a supplier . . .

SELECTING the right type of plastic pipe and the best supplier are two of the most important considerations in using plastic pipe in your plant.

Before determining the right pipe you must have these facts at hand regarding the end use:

1. Description of fluid or gas being handled
2. Concentration of solution or ph value
3. Pressure (maximum shock pressure possible)
4. Temperature
5. Where line will be installed (buried? exposed to sunlight? impact?)

When you have analyzed these details of your installation, you should discuss (with a qualified supplier who is informed and impartial towards all types of piping):

1. Basic type
2. Wall thickness in comparing prices and pressures
3. Availability and type of fittings; how they are connected
4. An immersion test when corrosive conditions must be met.

Choose your supplier as you would a friend. The supplier's advice will determine the success or failure of your installation. And it can mean the beginning of rewards in saving *time* and *money*.

Below are listed the names of major suppliers of plastic pipe. Most of these companies have qualified sales engineers who will be glad to talk with you about your installation and point out the right type of pipe for your needs.

WESTERN INDUSTRY hopes that you will explore the possibilities of using plastic pipe in your plant . . . and that it will bring you rewards in savings of time and money!

ALPHA PLASTIC, INC., Livingston, N. J.

Rigid PVC pipe and fittings, ¼" through 6" in five wall schedules.

Representatives

Calif., Los Angeles—Cherry-Burrell Corp., 4621 Pacific Blvd. LUdlow 8-5184
Calif., San Gabriel—W. E. Ferris, 422 W. Roses Rd. ATlantic 1-8389

AMERICAN AGILE CORP., Maple Heights, Ohio.

Polyethylene (branch), polyethylene (linear), polyvinyl chloride (rigid), polyvinyl chloride (high impact), and fittings pertaining.

Representatives

Calif., Riverside—R. L. Harris, 5245 King St. ANgelus 1-5639

THE AMERICAN BRASS & IRON FOUNDRY, Plastics Division, Newark, Calif. NEwark 3-2505

PVC pipe—½ in. through 4 in., schedules A, 40 and 120; butyrate pipe—½ in. through 4 in. SWP; clear butyrate pipe—SWP, schedules 40, 80 and 120; polyethylene pipe—½ in. through 3 in. IPS; polyethylene pipe—½ in. through 1½ in, 75 lb. pressure; polyethylene pipe—½ in. through 1½ in., 100 lb. pressure.

Branches

Calif. Los Angeles—Weiss-Green Co., 3457 So. La Cienega Blvd.
Ore., Portland—Howard Supply Co., 706 No. Page St.

Representatives

Calif., Bakersfield—Western Oilfields Supply Co., P. O. Box 391
Calif., Fresno—Rain for Rent, 510 Divisadero St.
Calif., Riverside—Rain for Rent, P. O. Box 581
Calif., Santa Paula—Western Oilfields Supply Co., 333 Riverside Dr.
Calif., Stockton—Delta Pipe & Supply Co., 520 No. Union St.

AMERICAN PLASTIC PIPE CORP., 16616 Garfield Ave., Paramount, Calif. NE 6-2065

IPS (iron pipe size) ½" through 2", Sch. 20, 40, 80, 120 PVC and Kralastic; SWP ½" through 6" kralastic; ½" through 4" polyethylene; 3/16" through ½" COP tubing (copper refrigerator tube sizes)

Representatives

Ariz., Phoenix—The Swanson Co., 2013 So. 16th St.
Calif., Emeryville—Grinnell of the Pacific
Calif., Los Angeles—Bethlehem Supply Co., 11100 So. Central. LOrain 7-1181; also, nine other cities in California
11 Western States—Grinnell Co., all principal cities

AMCO PLASTIC PIPE CO., 2002 Davis St., San Leandro, Calif. NE 6-0633

Kralastic and polyethylene plastic pipe and fittings, AMCO plastic electrical conduit and fittings.

Representatives

Calif., Los Angeles—McLoughlin Sales Co., P. O. Box 3255, Terminal Annex. RI 7-5635
Calif., Los Angeles—Paul S. Robinson Co., 2025 Beverly Blvd. DU 2-1247
Utah, Salt Lake City—Intermountain Sales, P. O. Box 223. EL 5-0286
Wash., Seattle—W. William Aya, 1104 Westlake Ave. No.

Note: AMCO Conduit could be purchased from any electrical wholesaler; AMCO plastic pipe can be purchased from any plumbing wholesaler.

CARLON PRODUCTS CORP., Cleveland 5, Ohio.

Flexible plastic pipe, rigid industrial pipe, rigid sewer and drain pipe, complete line of fittings.

Branches

Calif., Los Angeles—Carlon Products, 4712 Crenshaw Blvd. AXminster 2-8183
Wash., Seattle—Carlon Products, 1921 Lakeview Blvd., EAst 7-671

CRESCENT PLASTICS, INC., Evansville, Ind.

Flexible pipe and tubing, semi rigid and rigid pipe in polyethylene, kralastic and butyrate.

Branches

Colo., Denver—W. M. James & Co., 77 Lipan St.

Representatives

Colo., Denver—American Pipe & Supply Co.
Colo., Denver—Denver Brass & Copper Co.
Colo., Denver—Warner Co.
N. Mex., Albuquerque—Charles Ilfeld Co.
N. Mex., Santa Fe—Brown Pipe & Supply
N. Mex., Silver City—E. Cosgrove
Utah, Salt Lake City—Mountain States Rubber Co.

H. H. HARTWELL & SON, INC., 947 Park Sq. Bldg., Boston, Mass.

Normal impact (type I) polyvinyl chloride pipe, fittings & valves (Boltaron 6200); high impact (type II) polyvinyl chloride pipe (Boltaron 7200)

Representatives

Calif., Los Angeles—Blackman Plastic, Inc., 3125 So. La Cienega Blvd. TE 4789
Wash., Seattle—Chemical Proof Corp. of Seattle, 4430 Airport Way. MU 1877

KRALOY PLASTIC PIPE CO., 4720 E. Washington Blvd., Los Angeles 22, Calif. AN 1-4158

Rigid polyvinyl chloride pipe, both high and normal impact—complete line of fittings.

Representatives

Ariz., Tucson—Landmark Engineering, P. O. Box 5355
Calif., Compton—Viking Supply, 2200 No. Parmalee
Calif., Fallbrook—Ralph Brown, Rt. No. 1, P. O. Box 457
Calif., Fresno—Sunshine Landscaping Service Co., 4528 E. Madison St.
Calif., Los Angeles—Haldeman Pipe & Supply Co., 2220 E. 37th St.
Calif., Los Angeles—Crane Co., 321 E. 3rd St.
Calif., Pomona—Valley Pipe
Calif., Porterville—Valley Welding Works, 1606 W. Olive St.
Texas, Houston—Mott Company, P. O. Box 1658
Utah, Salt Lake City—Galigher Co., 545 W. 8th So. St.

LASCOPIPE, INC., 9746 Firestone Blvd., Downey, Calif. TO 1-1416

Kralastic, polyethylene, high impact PVC, tubing, Flex vinyl and tubing.

Representatives

Calif., Berkeley—California Farm Supply, 2223 Fulton St.
Calif., Lindsay—Submersible Pump & Service Co.
Calif., Los Angeles—Keenan Pipe & Supply, 2112 E. 27th St. LUdlow 3-4471
Calif., San Diego—Western Metals Co., 215 7th Ave. BElmont 3-3111
Calif., San Francisco — Alexander - Baldwin, Ltd., 215 Market St. EXbrook 2-4150
Calif., Vernon—Howard Supply Co., 5125 So. Santa Fe. LUdlow 8-1281
N. Mex., Carlsbad—Mine Supply Co.
Okla., Nowata—Nowata Machine Works

PLASTIC PROCESS CO., Division of Monadnock Mills, Los Angeles 45, Calif. BR 2-7518

Plastipipe #330 tenite-butyrate, SWP sizes ½" through 4" pipe and fittings; plastipipe #110 polyethylene, schedule 40 ½" through 2"; Special sizes in above materials as well as in rigid PVC, kralastic, cycolac, acrylic.

Branches

Calif., San Francisco—C. Martin Welch, 55 New Montgomery St.

Representatives

Calif., San Bernardino—Crane Co.—also Crane Co. branches in Southern California
Calif., Los Angeles—Haldeman Pipe and Supply
Calif., Los Angeles—Hirsch Pipe & Supply Co. —also Van Nuys.
Calif., Los Angeles—Union Pipe & Supply Co.
Calif., Los Angeles—Keenan Pipe & Supply Co.—also Pomona, Bakersfield
Nev., Las Vegas—Keenan Pipe & Supply Co.

PORTCO CORPORATION, Plastic Pipe Division, Vancouver, Wash. OX 4-1591

"Portco Poly"—100% pure virgin polyethylene pipe and fittings. "Portco 'K' "—100% pure virgin kralastic pipe and fittings.

See advertisement page 91

Branches

Calif., Los Angeles—W. R. Wallace, 4508 Crenshaw Blvd. AX 4-1686
Calif., Palo Alto—Paul Heppes, 425 Seale Ave. DA 6-2213

Representatives

Calif., Eureka—Eureka Boiler Works. HI 3-1618
Ore., Coquille—Enlund Equipment Co.
Ore., Eugene—Lumber Products Co.
Ore., Medford—Lumber Products Co., 753 So. Grape
Ore., Ontario—Van Petten Supply Co.
Ore., Portland—Cascade Plumbing Supply. AL 4-5563
Ore., Portland—Haseltine & Co. CA 8-7511
Ore., Portland—Lumber Products Co. CA 8-8175
Ore., Portland—R. M. Wade & Co. CA 8-7382
Ore., Portland—Waterworks Supplies Co. BE 4-5363
Wash., Seattle—Alexander & Baldwin. MAin 3677

Wash., Seattle—Schwabacher Hardware Co. EL 2683
Wash., Seattle—R. M. Wade & Co. SE 1818
Wash., Spokane—Waterworks Supplies Co. KE KE 5-2064
Wash., Tacoma—American Plumbing & Steam Co. BRoadway 3171

QUAKER PIONEER RUBBER DIVISION, H. K. Porter Co. (Delaware), P. O. Box 791, Pittsburg, Calif. HE 9-6161

"200" and "201" black flexible polyethylene pipe; black plastic flexible "200 and "201" non-toxic plastic pipe fittings; polyethylene pipe, 75-lb. rated.

Branches

Calif., Los Angeles—Quaker Pioneer Rubber Division, 4384 E. Bandini Blvd.
Calif., San Francisco—520 4th St. SUtter 1-5780

Representatives

Calif., Arcata—Munnell & Sherrill of Calif., P. O. Box 217
Calif., Los Angeles—L. A. Rubber & Asbestos Co., 118 E. 3rd St.
Calif., Los Angeles — Power Transmission Equipment Co., 4501 Firestone Blvd.
Colo., Denver—The Western Belting Co., Inc., P. O. Box 5544, Terminal Annex
Idaho, Boise—Intermountain Equipment Co., P. O. Box 1129
Ore., Portland—Munnell & Sherrill, Inc., 1163 N.E. 63rd Ave.
Utah, Salt Lake City—The National Equipment Co., 101 W. Second So. St.
Wash., Spokane — Intermountain Equipment Co., P. O. Box 2183

THE REPUBLIC SUPPLY CO. OF CALIFORNIA, P. O. Box 2137, Terminal Annex, Los Angeles, Calif. RA 3-2511

Pipe, fittings, valves.

Representatives

Ariz., Phoenix—251 So. 20th St., ALpine 3-1101
Calif., Avenal—4th & Skyline Dr., Avenal 251
Calif., Bakersfield—3600 Rosedale Hwy., FAirview 7-8471
Calif., Castaic Junction—NEwhall 350
Calif., Huntington Beach—17th St. LExington 6-4596
Calif., Long Beach—3080 Cherry Ave. GArfield 4-1684; NEvada 6-7213
Calif., Los Angeles—2600 So. Eastland Ave. RAymond 3-2511; PArkview 8-7151; Zenith 2511
Calif., Sacramento—1331 T St. HUdson 4-2807
Calif., San Diego—200 Ninth Ave. BElmont 4-8571
Calif., San Jose—442 Park Ave. CYpress 2-9097
Calif., San Leandro—1919 Williams St. ELgin 7-2211; ENterprise 1-1060
Calif., Santa Ana—615 E. Washington. KImberly 2-8871
Calif., Santa Fe Springs—11936 Telegraph Rd. OXford 6-1131
Calif., Santa Maria—Hwy. 101 and Newlove Dr. WAlnut 5-2657
Calif., Taft—6th and Supply Row. Taft 5-4191
Calif., Ventura—Ventura Ave. MIller 3-6158

RESISTOFLEX CORP., Roseland, N. J.

Fluoroflex-T hose, Fluoroflex-T laminated pipe, Fluoroflex-T flexible joints.

Branches

Calif., Burbank—Resistoflex Corp., 2919 Empire Ave. VI 9-4651

Representatives

Ore., Portland—Jack Ogle & Co., 2505 S.E. 11th Ave. BE 5-4080
Wash., Seattle—Jack Ogle & Co., 105 Orcas St. MO 2030

SLOANE MANUFACTURING CO., 7606 N. Clybourn Ave., Sun Valley, Calif. CHase 7-7121, STanley 7-9893

¼" through 3" plastic pipe fittings and valves.

See advertisement page 93

Representatives

Ariz., Phoenix—Swanson Co., 2013 So. 16th St. AL 2-6591
Calif., Burbank—Kerr Industries, 105 W. Spazier Ave. TH 8-2319
Calif., Downey—Lynch Asbestos, 9764 E. Firestone Blvd. TOpaz 1-1416
Calif., Newark—American Brass & Iron Foundry, 1650 So. Central. Newark 3-2505
Calif., Orange—Jordon Rogers Co. KEllogg 8-2326
Calif., Los Angeles—Bethlehem Supply Co., 11100 So. Central Ave. LOrain 7-1181
Calif., Los Angeles—Carlon Products Corp., 4712 Crenshaw Blvd. AX 2-8183
Calif., Los Angeles—Marken Plastic Corp., 2427 E. 55th St. LU 8-7283
Calif., Los Angeles—Plastic Process, 11200 Hindry. OR 8-9065
Calif., Los Angeles—Republic Supply Co., 2600 Eastland. RA 3-2511
Calif., Los Angeles—Triangle Conduit & Cable Co., Inc., 6466 Fleet St. RAmond 3-3687
Calif., Paramount—American Plastic Pipe Corp., 16616 Garfield. NE 6-7111
Calif., Santa Barbara—Plastic Pipe & Tube, 224 So. Milpas St. WOodland 5-8503
Calif., San Leandro—AMCO Plastic Pipe, 2002 Davis St. NEptune 6-0633
Calif., Santa Paula—Pipco, 1921 E. Telegraph Rd. Phone 1539
Wash., East Vancouver—Portco. OXford 4-1591
Wash., Tacoma—Western Plastic Corp., 3110 Ruston Way. SKyline 3538
Vancouver, B. C., Canada—Grandview Industries, Ltd., 3185 Grandview Hwy.

TRIANGLE CONDUIT & CABLE CO., INC., Plastic Pipe Division, New Brunswick, N. J.

Flexible pipe, semi-rigid, rigid high impact, duplex pipe polyethylene, nylon fittings.

Branches

Calif., Los Angeles—Triangle Conduit & Cable Co., Inc., 6466 Fleet St. RAymond 3-3687
Calif., San Francisco—Triangle Conduit & Cable Co., Inc., 2415 17th St. UNderhill 3-6260

Representatives

Calif., Los Angeles—R. E. Larsen, 6466 Fleet St. RAymond 3-3687
Calif., Oakland—H. B. Oliphant, 610 Oak St. TEmplebar 6-0868
Calif., San Francisco—R. F. McDonald, 2415 17th St. UNderhill 3-6260
Colo., Denver—Robert C. Starke Co., 7825 Colfax Ave. BElmont 7-1484
Ore., Portland—W. R. Norte, 2225 N.E. Broadway. ATlantic 8-3459 and ATlantic 1-3458
Wash., Seattle—A. Grant Burr, 7046 53rd St. KEnwood 0750

UNITED STATES STEEL CORP., COLUMBIA - GENEVA STEEL DIV., 120 Montgomery St., San Francisco, Calif. SU 1-2500

Polyethylene, polyvinyl chloride plastic pipe, etc.

Branches

Branch offices in: Phoenix, Ariz.; Los Angeles, Sacramento, San Francisco, Stockton, Calif.; Portland, Ore.; Seattle and Spokane, Wash.; Salt Lake City, Utah

Representatives

Calif., Emeryville—Thaler Pipe & Supply Co.
Calif., Los Angeles—Perry Kilsby, Inc.
Idaho, Pocatello—Grinnell Co.
Ore., Portland—R. M. Wade & Co.
Utah, Salt Lake City—Tubular Service
Wash., Seattle—Palmer Supply Co.
Wash., Tacoma—Tacoma Plumbing Supply Co.

VANTON PUMP EQUIPMENT CORP., Hillside, N. J.

PVC, styrene copolymer, and Buna-N pipe and fittings.

Representatives

Ariz., Phoenix—Ken Smith Co. ALpine 8-0901
Calif., Los Angeles—Pump Engineering Co. TRinity 5662
Calif., Oakland—H-W Engineering Co. GLencourt 2-4981
Colo., Denver—Alldredge & McCabe. ALpine 5-7496
Okla., Tulsa—Arduser & Co. Phone 4-2405
Tex., Houston—R. W. Bier. Fairfax 3-5391
Wash., Kirkland—Unit Process Co. VAndyke 6456

WESTERN PLASTICS CORP., 3110 Ruston Way, Tacoma 2, Wash. SK 3538.

Flexible polyethylene pipe ½"-2" in 75, 100 lb. pressures; standard wall polyethylene pipe ½"-3"; kralastic pipe (semi rigid) ½"-6".

Manufacturer's Representative

Calif., Oakland—Leland E. Green Co., 616 16th St.

Sales Representatives

Idaho, Wallace—Coeur d'Alene Hardware and Foundry
Wash., Bellingham — Morse Hardware Co. Phone 24
Wash., Everett—Everett Hardware Co. CEdar 2158
Wash., Olympia—Olympia Supply. FI 6-6659
Wash., Raymond—F. G. Foster Co. Phone 450
Wash., Seattle—Burhands-Sharpe Co., 1731 1st Ave. So. MA 9006
Wash., Seattle—Western Utilities Supply, 5409 Ohio St. RA 7025
Wash., Tacoma—American Plumbing and Steam Supply Co. BR 3171
Wash., Tacoma—Hunt & Mottet. MA 4174
Wash., Tacoma—Paramount Supply Co. BR 3161
Wash., Tacoma—St. Paul and Tacoma Lumber Co. MA 6181
Wash., Tacoma—Tacoma Plumbing Supply, 815 So. 23rd. BR 8445
Wash., Wenatchee—Tacoma Plumbing Supply. NO 2-7128

40 FREE BOOKLETS ON PLASTIC PIPE

Here are reviews of the best available booklets on plastic pipe. Obtain your selection by circling item numbers on rip-out postcard.

EXPLORING THE WORLD OF PLASTIC PIPE

Republic Steel plastic pipe roundup

Republic Steel Corp. has issued a 16-page manual, detailing uses of its semi-rigid butyrate, semi-rigid kralastic, and flexible polyethylene plastic pipe. Covered are advantages of Republic Steel pipe; how it is made; applications; joining; fittings; size, weight, pressures, flow, chemical resistance tables; and a question-and-answer section on uses of plastic pipe. Also available is a 2-page brochure generalizing above information. *Republic Steel Corp.*

. . . for your copy, circle No. 207

How to use Mills plastic pipe

A 26-page "how to do it" manual on plastic pipe has been published by the Mills Plastic Pipe division of Continental Can Co. The booklet includes a pipe selector chart . . . and detailed information on characteristics, uses, fittings, and chemical reagents tables on Mills Plastic saran, butyrate, polyethylene and styrene-alloy pipe and tubing. Also included are general installation instructions. *Mills Plastic Pipe division of Continental Can Co.*

. . . for your copy, circle No. 208

The Panther line of plastic pipe

Stocked sizes, prices, and much technical information are packed into a 28-page booklet put out by Western Plastic Corp. manufactures of the Panther line of plastic pipe and fittings. Technical section includes data on proper assembly, function of carbon black, safe working pressures, stress cracking, installation cautions, effect of temperature, installation techniques, chemical resistance data, pressure drop chart, *Western Plastic Corp.*

. . . for your copy, circle No. 209

(LISTING CONTINUED ON PAGE 92)

A SPECIAL SECTION OF THE JUNE 1957 ISSUE OF WESTERN INDUSTRY, 609 MISSION ST., SAN FRANCISCO, CAL. REPRINTS AVAILABLE AT 25c EACH UP TO TEN COPIES. PRICES ON LARGER QUANTITIES ON REQUEST.

Western Industry and Agriculture SPECIFY*

* PORTCO

PLASTIC PIPE

100% PURE VIRGIN POLYETHYLENE

for Economy, Durability, Long, Trouble-Free Life.

PORTCO POLY is ideal for dozens of industrial and agricultural applications. It is lightweight and flexible, easy to install, economical. Smooth, highly-polished interior finish —constant in all Portco Plastic Pipe—reduces friction and head loss, assures the ultimate in utility. Maintenance costs vanish with PORTCO POLY.

Check These Advantages of Laboratory-Tested PORTCO POLY:

- Non-toxic, odorless, tasteless.
- Resists environmental stress.
- Flexible, curves around obstacles.
- High tensile strength.
- In coils for long, coupling-free runs.
- Will not corrode and is not subject to electrolytic attack.
- All Portco Plastic pipe is approved by National Sanitation Foundation.

PORTCO POLY is available in standard coils up to 400 feet or is custom-extruded to longer lengths; sizes from ½ inch to 6 inch. Also, PORTCO "K" PIPE — semi-rigid, 100% virgin Kralastic, in 20-foot lengths or custom-extruded to longer lengths.

Write Portco Corporation for literature, information or name of nearest dealer.

PORTCO CORPORATION

PLASTIC PIPE DIVISION
VANCOUVER, WASH.

SERVING WESTERN INDUSTRY AND AGRICULTURE

... for more details, circle No. 59 on Reader Service Postcard

. . . for more details, circle No. 60 on Reader Service Postcard

BEST MANUALS ON PLASTIC PIPE . . . cont.

Uses, technical data on "PlastiPipe"

PlastiPipe, Inc., has made available a 16-page manual on general uses and technical data of its rigid, semi-rigid, and flexible plastic pipe. How the pipe is processed, how it is installed and fittings available are also included in this manual. *PlastiPipe, Inc.*

. . . for your copy, circle No. 210

Pointers on Crescent plastic pipe

Pointers on selecting and using plastic pipe, types produced—their uses and applications, limitations and other pertinent data are covered in a 16-page manual published by Crescent Plastics, Inc. Manual contains information about the company, installation techniques, a support table and other technical data. *Crescent Plastics, Inc.*

. . . for your copy, circle No. 211

Corrosion-resistant plastic pipe

A 12-page booklet gives complete technical information on Agile corrosion-resistant pipe, tubing, ducting, valves and fittings. Included is a table of physical properties of Agile pipe materials, tables on each of the pipe, detail of fittings, valves, ducting and tubing. Listed on the back are other brochures and booklets available on Agile plastic materials. *American Agile Corp.*

. . . for your copy, circle No. 212

Vanton pipe and fittings

Vanton Pump & Equipment Corp. has released an 8-page manual on its line of PVC, Styrene-Copolymer and Buna N plastic pipe, fittings, and valves. Tables show physical properties, chemical resistance, dimensions and pressures and sizes of the complete line. *Vanton Pump & Equipment Corp.*

. . . for your copy, circle No. 213

Triangle line of pipe, fittings

Complete manuals on rigid, semi-rigid and flexible plastic pipe and fittings are published by Triangle Conduit & Cable Co. These fact-packed books contain sections on: advantages, applications, chemical resistance, coil dimensions, dimensions and weights, district offices, electrical properties, fittings (with dimensions), handling and storage, installation, physical properties, pressures, pressure drop charts and other valuable information. Well illustrated. *Triangle Conduit & Cable Co., Inc.*

. . . for your copy, circle No. 214

"The pipe with the stripe"

Carlon Products Corp. has issued colorful 4 and 8-page manuals on its "plastic pipe with the stripe." Complete technical data and general description is given on its "D" line sewer and drain pipe; "L" line general purpose pipe (light weight, high impact, non-toxic); and flexible polyethylene corrosion proof plastic pipe in various sizes and working pressures. *Carlon Products Corp.*

. . . for your copy, circle No. 215

The pipe that's wrapped

Plastex polyethylene and kralastic wrapped pipe (better to handle, store, use) is described in data sheets covering sizes, physical properties, pressures, friction loss, temperature, chemical resistance and installation. *The Plastex Co.*

. . . for your copy, circle No. 216

Polyethylene pipe, polystyrene fittings

An eight-page manual describes Crane Co. pressure-rated plastic pipe and fittings. The polyethylene pipe is non-toxic and can be used to transmit drinking waters. Modified polystyrene fittings are available for all uses. Booklet gives installation data, sizes, weights, dimensions, pressure-temperature chart and other valuable information. *The Crane Co.*

. . . for your copy, circle No. 217

Pacific Western pipe and fittings

Several manuals and price sheets are available on Pacific Western Plastics pipe and fittings. Among booklets that are yours for the asking is a 12-page study of PVC pipe, showing sizes, physical properties and complete charts on chemical resistance; a 4-page booklet on polyethylene pipe listing complete technical data; descriptions of fittings; and price lists for all material. *Snow Irrigation Engineering Co. and Pacific Western Plastics.*

. . . for your copy, circle No. 218

PVC PIPE MANUALS

Boltaron PVC pipe, valves, fittings

H. N. Hartwell & Son, Inc., has issued several colorful manuals on Boltaron corrosion-resistant PVC pipe, valves and fittings. The manuals contain mechanical, electrical, thermal and chemical resistance properties, as well as all other pertinent information. Put together in interesting and handy guide form. *H. N. Hartwell & Son, Inc.* **. . . for your copy, circle No. 219**

The advantages of PVC pipe

The advantages of polyvinyl chloride (rigid) pipe are outlined in a 36-page report issued by the National Tube division of the U. S. Steel Corp. This bulletin, No. 24, gives an introduction to the use of PVC pipe: lists its properties, differences between normal and high impact pipe, chemical resistance data (compared with other piping material); details applications, sizes, pressure and temperature tolerances; head loss and flow characteristics, and fittings and installations . . . along with case history photos. *National Tube Div. of United States Steel Corp.*

. . . for your copy, circle No. 220

Latest word on Alpha PVC pipe

Just coming off the press is a new 12-page general catalog on Alpha PVC. Also available from this company are separate leaflets of prices of PVC pipe and fittings, and a 4-page manual on the "first engineered oil country pipe"—the Alpha 103. Properties and advantages of this pipe are detailed. *Alpha Plastics, Inc.*

. . . for your copy, circle No. 221

Normal, high impact PVC sizes

Southwestern Plastic Pipe Co. has issued a 4-page pamphlet on its normal and high impact PVC pipe in iron pipe sizes. Included is a chemical resistance table, a table of working pressure vs. temperature, suggested applications and installation procedures. *Southwestern Plastic Pipe Co.*

. . . for your copy, circle No. 222

Impact, chemically resistant pipe

Technical data on two types of Van-Cor PVC pipe are listed in 4-page manuals. Van-Cor 1 is a chemically resistant PVC pipe, and the manual describes its properties, sizes, resistance to all kinds of chemicals. Also included is data on installation and applications. The Van-Cor 2 manual parallels the other manual, with the emphasis on impact resistance. *Colonial Plastics Mfg. Co.* **. . . for your copy, circle No. 223**

POLYETHYLENE PIPE

New twists on polyethylene pipes

Johnson has put new twists on the polyethylene pipe line, forming a "Siamese-jet" pipe for jet pump installations, and a "subease" pipe for submersible pump installations. Also described in the 20-page manual are regular lines of polyethylene pipes, with data on characteristics, sizes and installation instructions. A complete list of fittings is included. *Johnson Plastic Corp.*

. . . for your copy, circle No. 224

Economical pipe for cold water lines

Folders and price lists are available from the Portco Corporation detailing its Portco Poly pipe—called the "most economical for cold water lines." Covered are specifications, installation and application data, pressure and temperature charts, and other pertinent facts. A price list on fittings is available. *Portco Corporation.*

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. . . for more details, circle No. 61 on Reader Service Postcard

Water delivery tables using Republic flexible pipe

Polyethylene pipe used for water supply is outlined in Republic Steel's 12-page manual. Tables for using the pipe for water delivery are featured throughout the manual—listing gallons per hour through various size pipes, gravity flow, setting in feet from tank to water level in well, etc. A list of sales offices in printed on the back. *Republic Steel Corp.* **. . . for your copy, circle No. 227**

"Proved by Performance" polyethylene pipe

A brochure—"Proved by Performance"—has been published by the Bakelite Co., describing a pipe made from Bakelite polyethylene. Bakelite poly resists rust, corrosion and freezing cold temperatures without losing flexibility. Specifications for safe working pressures of standard wall pipe, adopted by the pipe industry, are outlined in the brochure. *Bakelite Co.* **. . . for your copy, circle No. 228**

Water-conveying polyethylene pipe

A 4-page folder has been printed by Triangle Conduit & Cable Co. detailing its flexible pipe made from virgin polyethylene. Featured are applications for water service and jet wells. Also included are dimensions and physical data, fittings and installation. *Triangle Conduit & Cable Co., Inc.*

. . . for your copy, circle No. 229

SPECIAL TYPES OF PLASTIC PIPE

Fluoroflex Teflon laminated pipe

A 4-page manual gives pertinent data on a Teflon laminated pipe that is chemically inert, corrosion-proof, serviceable to 500 deg. F., and lightweight. Listed are construction details, advantages of this construction and piping specifications. The manual tells how the pipe fits into existing systems and how it can be used in special applications. *Resistoflex Corp.* **. . . for your copy, circle No. 230**

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. . . for more details, circle No. 62 on Reader Service Postcard

Special Southwestern Plastic pipes

Southwestern Plastic Pipe Co. has published 4-page manuals on its "Chem-Weld" drainage pipe (high impact strength; root-proof water tight joints; fast, easy installation), "Tenite II" (cellulose acetate butyrate plastic, designed for flow lines for salt solutions, sour crude, high paraffin crudes and as new and replacement gas lines) and "Kralastic" pipe (acrylonitrile copolymer plastic) especially chemical resistant. Manuals give all information necessary for deciding if the pipe could be used to advantage in your plant. *Southwestern Plastic Pipe Co.*

. . . for your copy, circle No. 231

Amco K-SWP plastic pipe

Amco Plastic Pipe Co. has described its K-SWP plastic pipe (styrene copolymer alloyed with a rubber copolymer) in a 4-page manual. Weight, cost, installation, sizes, chemical resistance, pressure, friction, uses—and fittings—are listed. Also available is a sheet on an Amco polyethylene pipe. *Amco Plastic Pipe Co.*

. . . for your copy, circle No. 232

Water, gas, oil line plastic pipe

Kraloy Plastic Pipe Co. has detailed uses of its special plastic pipe for use in water, gas and oil lines. A series of manuals covers the properties, applications and installation features of these pipes. Technical data are supplied on a rigid PVC plastic pipe for use in industry. Sheets on prices and fittings are included. *Kraloy Plastic Co.* **. . . for your copy, circle No. 233**

Uscolite corrosion-resisting pipes

A 12-page manual describes Uscolite CP pipe (good resistance to strong acids, active chemicals; for high impact strength and operating temperature) and Uscolite RV (higher resistance to strong acids, active chemicals; for good impact strength). Listed are applications, advantages, physical properties, corrosion resistance, installation, fittings, diaphragm valves, etc. *United States Rubber Co.* **. . . for your copy, circle No. 234**

Plastic-coated pipe and tubing

"Republic X-Tru Coat" plastic pipe and tubing is described in a 4-page manual. This brochure tells how the pipe gives the strength of steel plus the protection of plastic. Covered are: What is corrision? How can we avoid and combat corrision? Why polyethylene coating? What is Republic X-Tru Coat? How is it made? *Republic Steel Corp.* **. . . for your copy, circle No. 235**

PLASTIC FITTINGS, VALVES

PVC pipe fittings and flanges

Tube Turns Plastics, Inc., has published a 12-page booklet on pipe fittings and flanges made from polyvinyl chloride. The manual tells how companies are using these fittings and flanges—lists sizes, fabrication suggestions, chemical resistance, etc. *Tube Turns Plastics, Inc.* **. . . for your copy, circle No. 236**

Unplasticized PVC fittings

A 4-page booklet put out by Alpha Plastics, Inc., describes its molded Alpha 101 and 102 fittings. Sizes of all fittings are listed, and complete installation instructions are provided. *Alpha Plastics, Inc.* **. . . for your copy, circle No. 237**

Complete line of plastic fittings

Complete and detailed dimensions, specifications and price lists are included in booklets published by Sloane Mfg. Co. The 12-page dimensions and specifications manual gives complete technical data on all fittings. Included are iron pipe sizes and Plastic Industry standards for solvent weld pipe. The 22-page price list covers fittings made of Tenite II, Kralastic and rigid polyvinyl chloride. *Sloane Mfg. Co.* **. . . for your copy, circle No. 238**

"Rugged as a bear" fittings

Kraloy Plastic Pipe Co. has listed its "rugged as a bear" rigid vinyl, transparent and black Tenite II fittings in a 4-page pamphlet. Sizes, physical characteristics and applications are listed, along with a chemical resistance chart. *Kraloy Plastic Pipe Co., Inc.*

. . . for your copy, circle No. 239

All-molded PVC valves

Luncor PVC valves are described in this 4-page booklet, detailing their outstanding characteristics and telling how they can be used in individual applications. A chart shows all dimensions. *Lunkenheimer.* **. . . for your copy, circle No. 240**

PLANT ENGINEER'S LIBRARY — YOUR SELECTION FOR THE ASKING

25 BEST MANUALS ON INDUSTRIAL LIGHTING

"VISUAL COMFORT *for workers can increase the quality of your production, reduce waste and spoilage, lessen your accident rate, and improve employee morale*" (page 54 of this issue.) Correct choice of your plant lighting equipment, plus careful upkeep will make these benefits yours.

To give you access to the latest facts on plant lighting equipment and its maintenance is the goal of this portion of WESTERN INDUSTRY's unique self-service know-how library. The manuals collected during the past three months by WI editors for this special edition are offered free of charge to Western plant operating executives by special permission from the manufacturers who prepared them.

You are invited to check the concise listings appearing on pp. 95-97 and select those manuals that appear most appropriate in view of your plant lighting problems. Circle appropriate key numbers on this month's WI Reader Service Postcard (page 123), and we will be glad to see that you obtain your entire selection promptly. Note that this special offer expires on August 31, 1957.

Technical data for efficient lighting

Photometric charts, tables of application data, specifications and complete ordering information for industrial fluorescent fixtures are given in this manual. Introductory pages point out flexibility, quality, durability, installation and maintenance advantages of the products. It deals with various models of TD Luminaires for 2 or 3 slimline bipin or rapid start lamps; four and six lamp tandem fixtures; louvres, reflector baffle and end closures; hazardous location fixtures and other components and accessories. Includes blueprints for basic channel dimensions, and detailed table for calculating illumination for rooms 8 to 500 ft. long, 8 to 500 ft. wide, with ceiling heights from 8 to 30 ft. *Smoot-Holman Co.*

. . . for your copy, circle No. 250

Prescribed lighting for eye protection

Stressing that plant lighting by "prescription" provides an important tool for increased production, this 28-page manual outlines the four related visibility factors—size, contrast, time and brightness—and list 10 advantages of improved lighting. There are sections on safety factors, standards for use in prescribing lighting: uses of fluorescent, incandescent and mercury vapor lamps; lighting of other areas; maintenance, and condensed catalog data on fixtures. The three-color brochure includes frequent use of pictures, sketches and charts to supplement the text. *Sylvania Electric Products, Inc.*

. . . for your copy, circle No. 251

Answers to 25 industrial lighting problems

This 48-page, well-illustrated brochure presents 25 solutions to common industrial lighting problems, with each solution described as the answer to a specific problem in areas such as an aircraft hangar, heavy industry assembly, loading platform, machine shop, etc. Estimated hourly costs per 10,000 sq. ft. of light, and a picture of the completed installation appear with each presentation. *General Electric Co.*

. . . for your copy, circle No. 252

Illumination of stock room shelves and bins

The special problem of stock bin illumination, and a suggested solution for it, is the subject of this 12-page manual. It stresses the importance of efficient lighting in such areas in relation to order filling, eye fatigue, etc., tells how to select and install Stocklites specifically designed for this purpose, and gives complete data and specifications for ordering. Six light distribution curves bring out further helpful points. *Appleton Electric Co.*

. . . for your copy, circle No. 253

Maintenance manual for your lighting system

Recommended footcandle values; methods of estimating illumination; inspection, repairs and replacements are three of the 15-chapter headings in an informative maintenance manual for lighting. The book presents advantages of good lighting practice, helps you make the most of lights you now have, with suggestions for their care so that you will get the best and longest possible service. An accompanying brochure on building quality into lamps outlines the selection of various bulbs and lamps of the Champion line, that company's services, and technical data. *Champion Lamp Works.*

. . . for your copy, circle No. 254

"Comfort for Industry" is lighting theme

Facts on the CFI—Comfort for Industry—series is included in a 12-page catalog of Day-Brite lighting equipment. The series features slotted apertures in the reflector tops, and elimination of harsh ceiling contrasts for greater worker efficiency and increased production. Specifications are given for the CFI-10, that gives 10% upward light distribution and the CFI-25, that gives 25%. There is also data on industrial fixtures for locations where moisture or non-combustible dust is present, as well as on a variety of troffer fixtures and fixtures for different ceiling systems. *Day-Brite Lighting, Inc.*

. . . for your copy, circle No. 255

Facts on 200 floodlights and reflectors

More than 200 different floodlights, reflectors and mountings are listed and pictured in this 54-page catalog, indexed both by sections and numerically for each item. It presents lighting ideas for widely-varied applications, with photos and sketches to show typical uses. Sections in the manual include data on clusters and all purpose lights, several kinds of general purpose floodlights, specialized and portable lights, heavy duty and junior floodlights, high bay and standard reflectors; typical mountings, and accessories. *S & M Lamp Co.*

. . . for your copy, circle No. 256

Shallow depth lighting—only 4¼ in. deep

If your plant has low contemporary ceilings, or other dimensions that call for lighting mounted close to the ceiling, this brochure will give you helpful facts on the Slimlux lighting products, made with either luminous plastic light windows or solid steel sides. Available in 2 and 4-light models, in 4 or 8-ft. lengths, they feature a Gratelite, Louver-diffuser, low brightness lens pattern 70, or metal cross baffles, for various uses. *Edwin F. Guth Co.*

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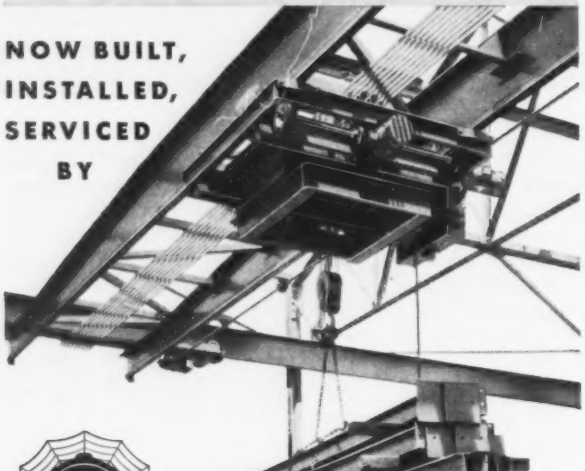

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BEST INDUSTRIAL LIGHTING MANUALS . . . cont.

Tips on lighting maintenance and cleaning

Benefits and techniques of efficient lamp replacement and the value and techniques of periodic, efficient cleaning of lighting equipment are considered in this helpful 12-page presentation. The discussion covers benefits of cleaning, light loss causes, fixture cleaning operation, devices for easier, faster cleaning, cleaning compounds trouble shooting, and facts on lighting maintenance companies. An appendix about the method of determining most effective economical cleaning intervals includes two tables on maintenance. *General Electric Co.*

. . . for your copy, circle No. 258

Bluegreen lights for critical work areas

Meeting the long-felt requirement for a special type fluorescent lamp in the blue-green spectral range is the Jade-Lite line described in two leaflets available. One tells why these lights provide greater "see-ability," exploring subjects such as functions of the light sense organs in the eye, why Jade-Lite minimizes glare, etc. It also presents three spectral energy distribution curves for further emphasis. The second brochure about these double-duty fluorescent tubes has nine typical case history photos, and a list of uses for which this lighting is particularly applicable. *Lustra Corporation of America.* . . . for your copy, circle No. 259

Facts on weather-proof fixtures, fittings

This 12-page bulletin for catalog insertion details and pictures Vapor-tight products used in steel mills, foundries, factories, power plants, boiler rooms, tunnels, etc., where weather-proof lighting is necessary. There are sections on basic components—junction boxes, gaskets, receptacles, globes and guards—standard fixtures of 100, 200, 300 and 500 watt; decorative and reflector type fixtures, accessories and miscellaneous parts. Complete ordering information is included. *The Adalet Manufacturing Co.*

. . . for your copy, circle No. 260

Localites for critical-work areas

This comprehensive catalog illustrates and discusses Localite, designed to provide proper quality and quantity of illumination for critical work-areas on machines, benches, tables, instruments and similar places in plants and shops. Each of the 40-plus pages is in the nature of a specification and data sheet, indicating some of the applications for which the unit pictured is designed. Some of the specialty products are for industrial sewing machines, laboratories, inspection benches, camera flashing lamps, etc. There are pages on accessories and attachments, and a price list with complete ordering data is included. *Fostoria Pressed Steel Corp.* . . . for your copy, circle No. 261

Universally adjustable Dextra-lites

This brochure gives details on the Swivelier line of incandescent and fluorescent lights, and for Coolites, that have extra safety factors to withstand heat. Sketches show principles of the swivomatic joint, turn swivel and fluorescent swivel. Specifications are given for desk model, clamp units, mounting bracket and bracket units for the series, which is universally adjustable, will not work loose or drop down. Similar data is given for the Coolite that has a metal shade engineered to remain touchable after long hours of use, and an air-vented triple shade design that directs heat away from outer shade and baffles light spill. *Swivelier Co., Inc.*

. . . for your copy, circle No. 262

Facts on convertible vaportight lighting fixtures

Dimension diagrams, cutaway photos, and specifications are featured in this manual about many different units in the V-51 series of convertible vaportight fixtures. Construction features such as the unilet, globe adapters, guards and reflectors are explained. The booklet also covers reflectors for fixtures, parts and accessories, and hand lamps. *Appleton Electric Co.*

. . . for your copy, circle No. 263

Fluorescent lighting guide book

Intended as a general reference book for users of fluorescent lighting, this manual has 24 pages of facts about practical results of this type of illumination. It features sections on general advantages and development of fluorescence, with chapters on each of the lamp types, starters, lampholders, ballasts and special lamps. Pictures, sketches and charts bring out more details on the subject, and a list of five major advantages of industrial and commercial usage is included. *Sylvania Electric Products, Inc.*

. . . for your copy, circle No. 264

Westinghouse guide to fluorescent equipment

This 24-page handbook is packed with data on fluorescent lighting, lamps and equipment, with particular emphasis on 15 operating characteristics of the lamps and auxiliaries. Numerous charts, tables, graphs and pictures are used. Other available literature covers Westinghouse luminaires—general and heavy duty (high and low bay), low and variable temperature, dust and vapor tight, general service and supplementary types—as well as mercury ballasts and different mercury lamps. *Westinghouse Electric Corp.*

. . . for your copy, circle No. 265

Helpful data on pathfinder and utility lights

Two fact sheets describe and picture special lights and fixtures for specific uses. The first covers nine models of pathfinder lights for many applications, all available with a 24 in. length of conduit riser pipe, and made of die-cast aluminum finished in black wrought iron color over weather-resistant zinc chromate. Standard assemblies include an alternate set of amber insect repellant lenses for summer, and colored lenses are available for directional use. Facts on installation and specifications are included. The second bulletin deals with utility pilot lights, giving descriptions, specifications, sketches and pictures of six models, including an indicator light with variously worded inserts. *Cannon Electric Co.*

. . . for your copy, circle No. 266

Fluorescent lamps in 9 different hues

What Lustra dated double-duty fluorescent lights offer—in terms of better, cooler, longer-lasting, glarefree light—is detailed in this pamphlet that covers 11 distinct design features. These include improved cathodes to keep lamps brighter and step up light efficiency, and position indicators for faster lamp replacement. Details on 9 different shades, and the uses for which each is suited, are given. *Lustra Corp. of America.*

. . . for your copy, circle No. 267

How group relamping can pay dividends

In this 12-page booklet you can learn how it's "cheaper by the dozens" to install GE lamps in large groups to get five important benefits. The book tells you how to have lower labor costs and more light, create fewer work interruptions, get better appearance, and sustain the life of auxiliary equipment through group relamping in your plant. *General Electric Co.*

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Use the SUPERWELD short cut to better production at LOWER COST. We have the largest controlled-atmosphere electric furnace west of Chicago. Many parts which formerly required scarce steels and excessive machine time are now made in our furnace, quickly and at considerable savings in cost.

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Cadillac Quik-Vac Model 14 has a 2-speed motor . . . an exclusive feature. High speed (super-suction) for the toughest vacuuming and blowing jobs . . . reduced power for cleaning small parts in stock bins, delicate wiring, etc.

Model 14 has a 3-in-1 Swivel Hose-coupler.* For vacuuming, it connects hose to dirt container or power unit intake . . . for blowing, to the power unit outlet. *Another Cadillac Quik-Vac exclusive that saves time, trouble and money.*

In just seconds, the *2-speed Power Unit can be demounted* for use as a hand-type Blower-Suction Cleaner.

THE *Rugged* MODEL 14

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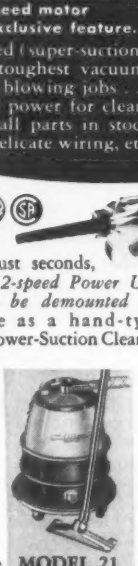

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- Cadillac Quik-Vac Model 14
- Cadillac Quik-Vac Model 21
- 2-speed portable Blower-Suction cleaner and 3 other job-rated models
- Hot- and Cold-Air Blower
- Furnace Blowers
- Gas Blowtorch
- Huge assortment of attachments for handling scores of cleaning and production jobs

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50 BEST MANUALS ON FLOORING, FLOOR CARE

THE PROPER FLOORING, correctly placed and maintained following modern concepts, can both *save* your plant operating dollars (through reduction of upkeep and replacement costs) and *earn* dollars (through more efficient production).

We'll bet that you are not fully aware of the many new products that are available to help you achieve these goals—in original flooring materials, revolutionary floor finishes, and floor care equipment that is achieving new levels of efficiency and speed.

That's why we've spent three months collecting the best available manuals that will bring you up to date fast. As a second section of WESTERN INDUSTRY's unique self-service know-how library, the manuals are offered here free of charge to Western plant operating executives by the special permission of manufacturers who prepared them.

You are invited to check the brief descriptions of the manuals appearing on pp. 98-103 and select those that promise to be of greatest value to you. Circle appropriate key numbers on this month's WI Reader Service Postcard (p. 123), and we will be glad to see that you obtain your entire selection promptly. Offer expires August 31.

30 BEST GUIDEBOOKS TO FLOOR MAINTENANCE

Manual on the latest waxes and polishes

This dual offering consists of a 16-page products catalog about floor waxes and polishes, with an 8-page brochure of information about the Columbia Wax company, its plant, laboratory, service policies, etc. Included in the variety of floor maintenance products described in the catalog is the emulsion-type floor polish, Safeguard, for use on practically any type of floor, with no buffing needed for lustre. *Columbia Wax Co.*

. . . for your copy, circle No. 270

60 pages of floor machine facts

This 60-page catalog has separate sections that cover each of the company's major floor machine products—sanders, vacuums, combination machines, polishers, steel woolers, etc.—plus several pages on floor maintenance generally. A how-to-do-it page lists type of work, proper attachment to use, and method of operation. Complete ordering data is given for the many models of machines included, and a 12-page price section gives more specific facts for your easy selection. *Holt Manufacturing Co.*

. . . for your copy, circle No. 271

Liquid floor hardener

Facts about Hornolith, a liquid chemical surface treatment for cement floors and concrete surfaces, are presented in an illustrated brochure that includes application pictures, the six simple steps in applying it and a list of widely varied uses for the product. *A. C. Horn Co.* **. . . for your copy, circle No. 272**

Blower-suction cleaners can do 100 jobs for you

Five models of this combination blower-suction cleaner are described and illustrated in a four-page data folder with facts on a variety of attachments and optional equipment that provide versatility. The cleaner comes in double-, heavy- and medium-duty types as well as models with hot or cold air, and Model AY for use where smaller volume of air is needed. Data sheets about the firm's Model 14 industrial vacuum cleaner, with wet or dry pick-up, are also available. *Clements Mfg. Co.* **. . . for your copy, circle No. 273**

Mr. Higby, the gremlin and you

. . . is the story told in a provocative booklet about the Legge system of safety floor maintenance. What Mr. Higby found out—and you will too—from the gremlin are the advantages of this system in relation to safety, appearance, cutting costs, lightening maintenance, and preserving floors. Complete descriptions of the five types of cleaners, four polishes, damp-sweep and anti-slip products, floor seals and conductive products are given. Along with this unusual instructive pamphlet are pocket-sized folders about the above products and an informative brochure about conductive coatings and their maintenance. It gives tips on dangers of static electricity explosions and describes two coatings and personnel grounding devices. *Walter G. Legge Co., Inc.*

. . . for your copy, circle No. 274

Engineering data on power sweepers

Literature offered by the Wayne people gives data on their line of power sweepers that are rugged, durable, efficient and fast. Features of the LP gas and battery-powered models such as automotive transmission and steering, full vision, large hopper capacity and various safety factors are described in text and pictures. It includes full information on a new model with a 30-in. sweeping swath designed for use in narrow industrial aisles. *Wayne Manufacturing Co.* **. . . for your copy, circle No. 275**

"How to Care for Your Floors"

. . . has become a standard reference on the finishing and maintenance of floors. Published by Johnson, its 23 pages tell you in words and pictures the best methods for taking care of all common types of floors. It also has special features such as the sections on "How to cure sick floors," "Tips on day-by-day maintenance" and "What products are best for *your* floors?" A page on floor safety lists nine points to remember, with sketches for emphasis. *S. C. Johnson & Son, Inc.*

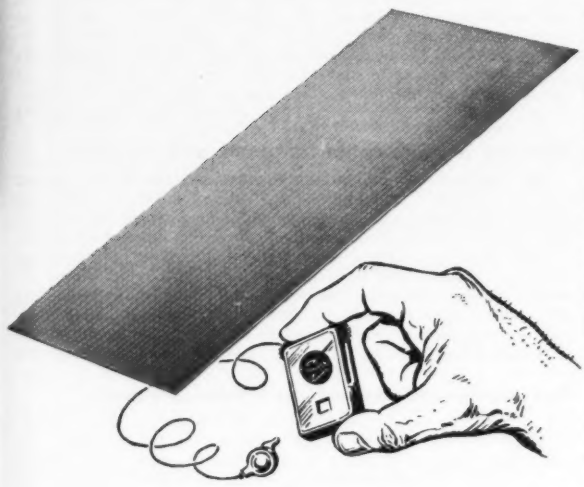
. . . for your copy, circle No. 276

Data on electric scrubbing, polishing machines

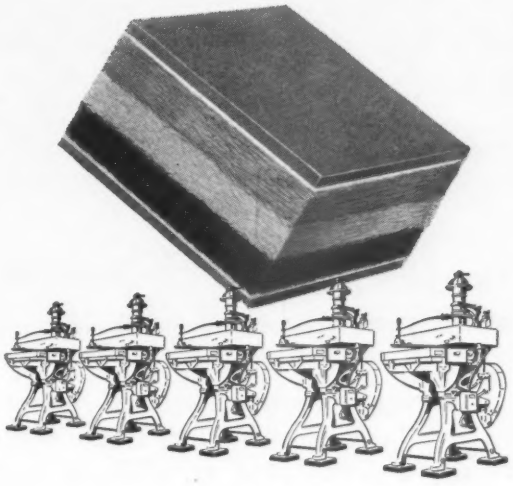
Fact sheets on fifteen models of floor machines, scrubber-vacs, sub-stations, mop trucks, etc., in this catalog give specifications, design features and other pertinent data. It covers machines that scrub rugs and apply wax; convertible types, and many attachments and accessories for the equipment. There are a detailed instruction manual section for one model, and facts about industrial cleaning agents such as waxes, sealers, powders and soaps for use with the machines. *Finnell System, Inc.*

. . . for your copy, circle No. 277

A paper-thin battery separator felt for hearing aids



. . . or Vibra-Mount felts to cut machine vibration*



Put the MAGIC *of American Felts to work for you*

New things are happening most every day at American Felt Company. Exciting things you never dreamed could happen with felts. The battery separator, for example, is made from one of our Feutron** Felts, a combination of synthetic fibers that makes this separator more resistant, longer lasting than the usual material employed.

On the other hand the unusual properties of wool fibers as combined in American's Vibra-Mount Felt eliminate as much as 85% of a machine's vibration, no bolts are needed to fasten machines to concrete or wood floors, "walking" of machines is prevented.

These are just two of the many uses for the felt wonders constantly being produced through the ingenuity of American's Research and Engineering Staff. Use your imagination and many more uses will come to mind.

For the first things in felt it will pay you to call American first. Design with American Felts.

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You CAN get famed* MASTER quality in standard sizes too . . .
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BEST FLOOR MAINTENANCE MANUALS. . . cont.

60-page floor maintenance product manual

Made up of pamphlets covering many categories of general and floor maintenance products, this catalog is packed with suggestions and ideas for preservation and sanitation of floors, etc. Principal classifications in the Brulin book are floor finishes, waxes and seals for all types of flooring; cleaning compounds for floors and general cleaning; maintenance products such as disinfectants, and solvents and compounds for industrial cleaning, such as degreasers and steam charge liquid. The catalog has complete descriptions of all products and the job each will do, and includes action pictures, charts and sketches. Separate sections of the catalog in the above product classes are available. *Brulin & Co., Inc.*

. . . for your copy, circle No. 278

Facts on a combination scrubber and vacuum

The complete story on the Autoscrubber is given in this circular with action shots, comparison chart and specifications. The five different machines, with scrubbing width range from 18 to 60 in., are clearly pictured and described. How the unit automatically spreads cleaning solution, scrubs, rinses, picks up and dries the floor is explained, and the illustrated copy also reviews nine exclusive design features. The comparison chart shows time and labor-saving aspects of using a deck brush, mop and pail or floor machine and vacuum, as against one man using an Autoscrubber. *American Floor Machine Co.* **. . . for your copy, circle No. 279**

Fact sheets and manual on power sweepers

Two types of power sweepers—the heavy duty and the industrial special—are covered in this presentation that includes fact sheets and a sales and service manual. Specifications for the MHD 38 and MHD 48, such as sweeping swath of 36 or 48 in., traveling and sweeping speeds, dimensions, dust control, transmission, engines, etc. are given. Similar facts deal with the three industrial special models. The sales-service manual includes technical data on engines, installation, cleaning, etc. *Modern Power Sweeper Co.*

. . . for your copy, circle No. 280

Planning guide, case histories on floor care

This assortment of literature includes a planning guide that shows you how to cut dollars and hours from your floor cleaning costs; a selection of picture case histories about the Plantman motorless mechanical sweeper and the Floormobile for cleaning large floor areas and controlling dust, plus other brochures about these two pieces of equipment. Construction details, specifications and other data about the products are included, along with photographs and sketches. *Handling Devices Co.*

. . . for your copy, circle No. 281

Helpful data on adhesives and coatings

This assortment of literature about industrial adhesives and coatings includes a comprehensive selection chart that covers six categories of coatings with application method, characteristics, color, weight, open time, etc.; and an eight-page pamphlet about adhesives for tile; fastenings for insulation and protective coatings, and insulation and insulation protection. Slip-not, a coating for stairs, floors, shower stalls, etc., is described in a catalog sheet as well as in a pocket-sized leaflet with brief facts about some of the company's other products. *Miracle Adhesives Corp.*

. . . for your copy, circle No. 282

Maintenance handbook for variety of floors

In its 18 pages this handbook gives specifications for the original treatment and the maintenance of all types of floors. Breaking the subject into sections about different types of floors, it deals separately with resilient floors—vinyl, asphalt, rubber and linoleum; cork; terrazzo; concrete; wood of various types; and marble, quarry tile or ceramic tile. Detailed directions for best care of these are given, as well as for cleaning and removing wax or resinous finishes and for applying water emulsion waxes and style finishes. *Vestal Incorporated.* **. . . for your copy, circle No. 283**

Descriptive data on magnetic hand sweepers

If keeping plant work areas, driveways and parking lots free of tramp iron is one of your problems, literature about the Magni-sweeper will interest you. You'll get details about the sweepers that are mounted on semi-pneumatic ball-bearing wheels and designed to be pushed by hand, towed behind a vehicle, or with handle removed, suspended from lift truck forks. Details of construction, sizes and magnetic strengths are included. *Magni-Power Co.* **. . . for your copy, circle No. 284**

How to remove stains from floors

. . . particularly the 14 "problem" stains is the subject well-covered by this maintenance manual. Easy-to-follow directions tell you what to do and what to avoid, what materials you need and how you can get them easily. First steps deal with general stain and spot removal from all floors, followed by specific instructions for soft floors—asphalt tile, master, cork, etc., and for hard floors—concrete, marble, ceramic tile, etc. How to remove the problem stains, which include tobacco, fire, ink, dye and grease—is clearly and separately explained. Instructions for repolishing marble and terrazzo are included. *Huntington Laboratories, Inc.*

. . . for your copy, circle No. 285

32-page manual on proper care of floors

The triple process of floor preservation is the theme of this instructive report that deals with cleaning, sealing and maintaining floors. Sections deal with those three phases, as well as floor surfaces, helpful hints, covering capacities and scope of the West company's products. More than 20 of the company's products are described for use in the various steps and a handy preservation guide relates to a dozen types of flooring materials or surfaces. *West Disinfecting Co.* **. . . for your copy, circle No. 286**

Rust-Oleum catalog gives floor care hints

A section of Rust-Oleum's general catalog for 1957 is devoted to coatings for wood and concrete floors and to Surfa-Etch solution for cleaning and etching concrete floors. Actual color samples of the coatings in four shades are included and specific directions apply to floors and coverages of the coatings for varied purposes and floor materials. In the Surfa-Etch portion, application directions are given and pictures emphasize the efficiency of the solution *Rust-Oleum Corp.* **. . . for your copy, circle No. 287**

Fuller work sheet organizes maintenance

Planning your maintenance methodically is easy with this Fuller work organizer that calls for considering each job three ways—as to work area, cleaning operations, and time. The handy folder classifies cleaning operations to be done weekly, or as needed; lists cleaning tools and supplies, and has a check list for workers and work areas. The kit includes sample work sheets so that you can have similar ones made for your particular needs. Also available is a fact sheet with details on Fuller sweeping mops with swivel connectors, and an eight-page pamphlet on industrial maintenance chemical products of the company, covering waxes, cleaners, polishes and disinfectants, with brief facts about Fullergrin brushes. *Fuller Brush Co.* **. . . for your copy, circle No. 288**

Maintenance with the Multi-Clean method

This two-part literature offering includes a catalog section of everything you need for better floor care, and a manual on the Multi-Clean method for maintaining your asphalt tile floors. Described and pictured in the first are floor and scrubbing machines, industrial vacuum cleaners, furnace cleaning equipment, floor sanding machines, waxes, cleaners, preservers, and rug and upholstery shampoos. The maintenance manual gives helpful tips on new floor care, the method for low-cost maintenance, and how to renew asphalt tile. Ordering information for the floor treatment products is included, as well as brief facts about cleaning equipment. *Multi-Clean Products, Inc.* **. . . for your copy, circle No. 289**

Spec sheet for vacuums and floor machines

Six popular sizes of floor machines and four models of industrial vacuum cleaners are described and pictured in catalog sheet C-1355. Construction featuring balanced power is thoroughly explained for the floor machines that have brush diameters from 11 to 22 in., speeds from 135 rpm. to 160 rpm, 40 or 50-ft. cables, and split phase, capacitor or repulsion induction motors from ¼ to 2 hp. Data on the vacuums ,give types, capacity, vacuum at 115 v., air volume, filter area and carriage dimensions. *The Kent Co.* **. . . for your copy, circle No. 290**

"Hold that Dust Down"

. . . is the subject of a pocket-sized leaflet about Mopwhyte—milky white emulsion that functions three ways for dust control. How it works for impregnating dust cloths to be used with a mop, as a treatment solution in which the mop is soaked, and as a floor dressing to be used as a spray are clearly explained. *The C. B. Dolge Co.* **. . . for your copy, circle No. 291**

Quick facts on epoxy resin concrete coating

This handy card describes a method of protecting eroded concrete by Epocast epoxy resins and gives necessary application data. *Furane Plastics, Inc.* **. . . for your copy, circle No. 292**

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For quick, efficient service call your Industrial Distributor. He is your most economical source of supply.

. . . for more details, circle No. 68 on Reader Service Postcard

Details on dust-free low cost power sweeping

This catalog sheet lists in detail the specifications, applications and advantages of the new Parker Turbo-Sweep 40 that collects dirt, paper, all debris, and can sweep 50,000 sq. ft. per hr. Design details such as the lightweight dump hopper, rota-sweep brush and long-life bristles are sketched. *Parker Sweeper Co.*

. . . for your copy, circle No. 293

Facts on floor machine that does 10 jobs

This 12-page catalog about the Floor-King tells how the machine does 10 maintenance jobs, lists 14 check points to check before you buy, and outlines how to select a machine for any job, any budget. It includes information about attachments. *American Floor Machine Co.* **. . . for your copy, circle No. 294**

Engineered cleaning power with the Swivflo

Secrets of Swivflo, a sweeping mop with an all-metal frame and handle combined with rope yarn two-layer filler, are told in a four-page brochure. Construction details and the advantages of the swivel action are shown in a series of sketches, with accompanying copy. Tips on proper care of the tool, plus a list of 10 design features, are included. *Columbia Wax Co.*

. . . for your copy, circle No. 295

Ferem floor topping—with diamond hardness

Composition and uses of Ferem floor topping, and how it can give almost the same hardness as a floor laid with ½ in. of commercial diamonds, is the subject of this four-page brochure. Pictures and text combine to point out advantages of this heavy duty floor topping that provides a dense, ductile floor with a high noncrush capacity. *A. C. Horn Co.* **. . . for your copy, circle No. 296**

Time to start sanding

. . . is the title of an authoritative pocket-sized booklet on the do's and don't's of using a portable electric floor sander. The illustrated manual covers a checklist of equipment needed, how to prepare floor for sanding, how to attach paper to drum, method of using drum sander and edger, choice and sequence of using abrasives, a word about disc sanding and the final application of seal and wax. *American Floor Machine Co.*

. . . for your copy, circle No. 297

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Ball & Roller Bearings
Serving the Southwest since 1919
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SPECIALISTS IN BEARINGS AND POWER TRANSMISSION EQUIPMENT
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WAREHOUSE & CUSTOMER SERVICE: 1937 So. Flower St., Los Angeles 7, Calif.
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. . . for more details, circle No. 69 on Reader Service Postcard

20 BEST GUIDEBOOKS TO INDUSTRIAL FLOORING

Floor plate that permits week-end repair

A floor plate that you install with just three simple steps is described in this four-page presentation that explains the method with pictures. Called the "floor that heavy loads can't lick," the steel plate is pictured in areas where heavy industrial traffic calls for uninterrupted year-in, year-out use, with minimal maintenance. How the plate can reinforce fast-drying hard cement mastics to quickly patch floors for week-end repair is explained. *Acme Steel Co.* **. . . for your copy, circle No. 298**

An answer to resurfacing or repairing floors

Super-Bondsit, a concrete topping for repairing cracked floors or resurfacing existing wood and concrete floors, is explained in this illustrated pamphlet. Unusually resistant to dilute forms of acids, alkalis, oils and fats, the topping is a liquid latex emulsion added to cement mixtures in place of most of the mixing water. The booklet includes pictures case histories, application instructions and mixing proportions. *A. C. Horn Co., Inc.*

. . . for your copy, circle No. 299

Data folders on two types of steel flooring

Two illustrated engineering data bulletins available on solid and open steel flooring point out design feature of each. One on solid flooring, of large, medium and small pattern sizes, has application pictures showing its wide uses in industry; tables showing safe uniform load in lb. per sq. ft., and lengths, gage and lb. per sq. ft. A similar table of safe loads, ordering information, a typical blueprint layout, recommended bearing bar sizes, and sketches of different types of Ry-Weld flooring are featured in the second bulletin. *Joseph T. Ryerson & Son, Inc.*

. . . for your copy, circle No. 300

Dimensions, weights, load tables for Multi-Grip

This fact-packed four-page folder tells the story of Multigrip floor plate, its construction features, specifications and other data. Six installation pictures emphasize advantages for widely varied uses, and other photos point out its positive skid resistance, and ease of cleaning, and fabricating and quick-drain aspects. *U. S. Steel Supply.* **. . . for your copy, circle No. 301**

Laykold asphalts—their industrial uses

Fourteen Laykold emulsified asphalt products and their uses in industry are detailed in this descriptive folder. Floor mastic binder, wood block cement, crack filler, insulation adhesive and weathercoat are some of the items dealt with and pictured. *American Bitumuls & Asphalt Co.* **. . . for your copy, circle No. 302**

Specs and dimensions for steel grating types

To aid you in selection of the proper type and weight of flooring for your specific jobs, this catalog presents facts on electroforged, interlocked, riveted, U-type diagonal, heavy-duty and T-bar grating. Its 26 pages give types, spacings, weights and panel widths for these kinds of grating, with emphasis on the electroforging process the firm employs. Tables of safe loads, illustrations and a section on how to specify grating are included. *Blaw-Knox Co.*

. . . for your copy, circle No. 303

Photos and facts on Ferrox floor covering

Five vital factors that make this type of non-slip industrial floor covering worthy of your attention are outlined in a four-page leaflet. Eight case history pictures show it being used on a duckboard in front of a grinder, around plant washstands, on an outdoor ramp, as a walk on an oil storage tank, etc. Comments from satisfied customers are included. *American Abrasive Metals Co.*

. . . for your copy, circle No. 304

Load data, specs on new aluminum grating

Information is now available on a new type of aluminum grating that meets demands of industry for heavy and versatile usage and for which production began early this year. The literature includes load data and specifications for the RR grating designed to retain combined advantages of a rectangular opening and riveted grating. Easily cleaned and very durable under severe load conditions, this RR grating remains structurally rigid regardless of cutouts located in any part of the panel, has a 79% clear opening, and is particularly applicable in fields such as chemical, shipping, automobile, room dividers, etc. *Klemp Metal Grating Corp.*

. . . for your copy, circle No. 305

Here's an answer to your patching problems

Magic patching with Vinl-Hesive is explained in two brochures and an accompanying data sheet. How this method is used for feather edge patching, re-topping a complete floor and other uses is clearly explained with text, photos and sketches. Used with Portland cement mixtures, the Vinl-Hesive makes a self-curing, permanent patch that reduces mortar shrinkage and makes concrete more waterproof. Brief facts are also given for wood preservative, concrete surface hardener and other products of the company. *Contractors Chemical & Supply Co.*

. . . for your copy, circle No. 306

Brochure on floor grating and safety steps

All-weld, riveted and pressure locked construction types of floor grating with various designs for standard and special applications are discussed and illustrated in this brochure that also covers aluminum and steel gratings, steel floor armor, roadway grating and sidewalk slabs, to give complete coverage of the grating industry. There are sections on how to order accurately, together with comprehensive technical information on safe loads, weights, etc. Application pictures, sketches and tables add further interest, and installation instructions have accompanying photos. *Borden Metal Products Co.*

. . . for your copy, circle No. 307

Facts on Firm-Grip grating and safety equipment

This 20-page catalog tells about a line of all-directional safety grating, for use in auxiliary steps, truck body steps, stair and ladder treads, etc., as well as special safety equipment such as work platforms, gates and mats for trucks. Complete ordering data in the form of tables and sketches is included, along with application photos and pictures of various types of grating construction. *Bustin Steel Products, Inc.*

. . . for your copy, circle No. 308

16-page bulletin covers grating and stair treads

Important construction features of Tri-Forged Welded and Tri-Lock Interlocked grating and stair treads are discussed in this 16-page booklet, with photographs and detail sketches to illustrate many styles available and typical installations. Information on serrated grating, armoring and flooring is included. A series of tables lists the grating weights, standard stair tread sizes, panel widths and safe bearing loads for bearing bar spacings. *Dravo Corp., Machinery Div.*

. . . for your copy, circle No. 309

20-page manual on Gary grating and treads

Four types of grating, open steel flooring, stair treads, fastening devices, welded decking, and area or drain grating in the Gary line are described and illustrated in this manual. Installation facts, a two-page engineering data section, and many application pictures supplement the easily-read text. *Standard Steel Spring Div., Rockwell Spring & Axle Co.*

. . . for your copy, circle No. 310

Facts on expanded metal grating

Six mesh sizes of expanded metal grating—five of steel plate, and one of aluminum—are listed in this illustrated folder. It includes tables giving sizes, weights, dimensions and deflections for uniform live loads, as well as recommendations for selection of the proper mesh for varied uses. Application photos and pictures illustrate the differences in meshes. *Penn Metal Co.*

. . . for your copy, circle No. 311

Selection guide, load tables for Grate-X

This type of expanded metal grating, principally used on floors for light storage and foot traffic, is treated in an eight-page brochure. Technical data, a load and deflection table, application details are given for the steel type, for aluminum Grate-X, for those of lighter metals and for stair treads. *U. S. Gypsum Co.*

. . . for your copy, circle No. 312

How anchor plates end floor maintenance safely

Twelve important advantages in the use of Stelcon anchor steel plates for a durable damage-resistant hard steel surface are listed in this bulletin. Facts on installation, construction, existent uses in industry are outlined and several case history pictures emphasize the design features listed. *Stelcon Industrial Floors, Inc.*

. . . for your copy, circle No. 313

Data on Alundum aggregate for floors

Three forms of Alundum aggregate products for non-slip, wear-resistant floors, ramps and stairs are described in this catalog's eight pages. An explanation of the abrasive, combined with terrazzo and cement for greater safety and durability is given, along with application photos, close-ups, data on color, grades, etc. *Norton Co.*

. . . for your copy, circle No. 314

New RIDGID

4PJ Geared Threader is now

*** JAM-PROOF**

Patents Applied for

***Automatically Stops Threading After Standard Length Thread Is Cut**

Power drive threading is safe and easy with this new 4PJ—no more watching of either die stock or drive! 4PJ can't jam—drive pinion kicks out automatically after full thread is cut. Extra-easy to handle . . . mistake-proof workholder, no bushings . . . fully enclosed gears . . . RIDGID most-for-your-money—Buy new 4PJ at your Supply House!

RIDGID 400A Power Drive with Universal Drive Shaft operates 4PJ Threader on 2½" to 4" pipe held in Tristand Chain Vise, all RIDGID products.

The Ridge Tool Company, Elyria, Ohio, U.S.A.

RIDGID

Work-Saver Pipe Tools

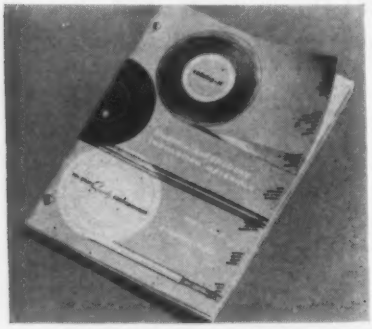
. . . for more details, circle No. 70 on Reader Service Postcard

HELPFUL LITERATURE for the West's plant operating executives

FOR YOUR FREE COPIES, circle appropriate key numbers on postcard, page 123

68-page manual on insulating wires and materials

Over 191 categories of electrical and electronic insulating materials, wires and accessories are described. It covers latest developments in insulating tapes, cloths and varnishes; sheets,



tubes and rods; wire and cable; tools, equipment and lubricants. Available free to all engineers, production, maintenance and repair men in the electrical and electronic industries, this reference guide is valued at two dollars per copy. *Tri-State Supply Corp.* . . . for your copy, circle No. 151

Manual simplifies piping system identification

How to indentify any piping system by colors and lettering is clearly outlined in a manual that gives specifications approved by the American Standards Association in conjunction with the National Safety Council and American Society of Mechanical Engineers. It tells the color to be used for each class of fluids and gases, reproducing the colors in actual tones, as well as giving the size and frequency of legends and complete explanations of the dual methods recommended—by color and by legend. *Rust-Oleum Corp.* . . . for your copy, circle No. 152

8 products for roofing maintenance needs

This handy pocket-sized folder contains descriptions of eight roofing and damp-proofing products created for maintenance and repair services. The paints, emulsions and coatings include types for flashings, skylights and parapet walls; for exposed felt and masonry surfaces or foundation damp-proofing; for repair of badly alligatored roofs; for patching composition roofs etc. *The Philip Carey Mfg. Co.*

. . . for your copy, circle No. 153

Fact-packed manual on maintenance supplies

Practically every item that you use in your plant maintenance program—and some that you didn't realize you need—is listed in this comprehensive catalog. Indexed both by departments—such as soaps, dispensers, mopping equipment, floor mats, light bulbs, and polishes—and by individual products in the hundreds, it gives complete descriptions of each article, with pictures of many. The 36-page catalog also has a section filled with practical floor care hints and data on floor safety. *Easterday Supply Co.*

. . . for your copy, circle No. 154

Facts on 70 different waste receptacles

Some 70 models and types of waste receptacles—swing-top, open-type, catch-all, outdoor and counter—plus several types of liners for the units, are described and illustrated in this catalog. There are different sizes and weights for a number of the major ones. *Mipro Metal Products Co.*

. . . for your copy, circle No. 155

Data on seamless titanium metal pipe and tubing

This 12-page booklet is slanted for engineers associated with the design or operation of tubular equipment used in severe corrosive environments. It presents in detail the size, range tolerances and wearing properties of the metal in tubular form. *Tubular Products Div., The Babcock & Wilcox Co.*

. . . for your copy, circle No. 156

Inside story on Garrett Supply services

A concise but complete outline of the services available at Garrett Supply Division is presented in this brochure giving complete customer service information. Tabbed for quick file reference, the pamphlet gives a listing and description of all the lines carried by the company, with photos showing

large stocks on hand. Specific information is given on what department to contact for speediest service on particular types of calls, and where to pick up "Will Call" orders. Illustrations include individual pictures of men in the sales staff, show the company's operating system and specialized aid for customer problems, including engineering assistance in the field. *Garrett Supply Div., The Garrett Corp.*

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Faster installation . . . . . $
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Fewer mistakes . . . . . $
Increased production . . . . . $
Greater precision . . . . . $
More attractive merchandise . $
Increased sales . . . . . $
Higher profits . . . . . $

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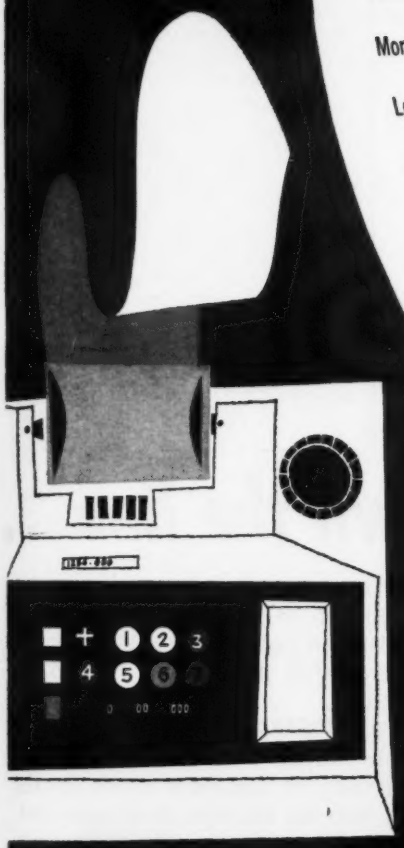

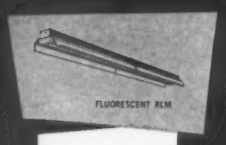

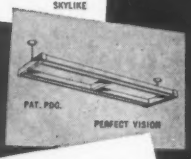

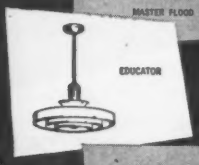

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Data on free wheeling rubber tired wheels

Rubber-tired demountable wheels that are free wheeling, and 20 to 25% easier rolling, are discussed in this four-page bulletin, with a question-and-answer section that brings out pertinent facts about the designs of the series for floor truck, trailer and caster applications. A pictorial sequence shows the easy-to-replace tire feature that cuts operating and maintenance costs. Specifications give all dimensions. *Nutting Truck & Caster Co.*

. . . for your copy, circle No. 158

VISE-GRIP

WRENCHES

HSCO IN STOCK AT HOWARD SUPPLY COMPANY

. . . for more details, circle No. 73

How to start a pump maintenance card file

An aid to manufacturers whose production involves use of many pumps is a pump maintenance record card providing for complete data on installation, application and maintenance. There is enough space on each card to keep records for several years—in some cases for the pump's entire life. These complete maintenance records, filed accessibly, are invaluable in diagnosing pump failure, in ordering repair parts, and in scheduling lubrication and maintenance. In requesting card supply, state number of pumps for which you need cards. *Goulds Pumps, Inc.*

. . . for your copy, circle No. 159

Spec sheet for vertical milling machine

Fourteen design and construction features of the Model VM vertical milling machine are outlined for you in this four-page pamphlet, with several photographs to emphasize essential facts. Complete specifications for the 500-lb. machine are given, and a list of attachments such as dividing centers, rotary tables, splash guards, collets, etc. *Rotex Punch Co., Inc.*

. . . for your copy, circle No. 160

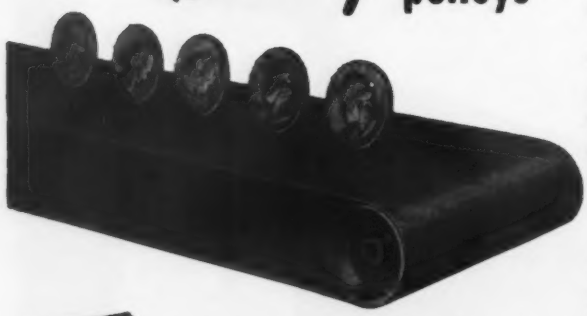
Data on services offered by custom fabricators

Titled "Craftsmen in Metals for Industry" is a 12-page brochure that outlines the history and services of an industrial firm of custom fabricators with the skills, experience and equipment to handle a wide range of metal fabricating projects. Organized to plan, engineer and construct, the company is coordinated to take over widely varied assignments from small and routine jobs to large scale and difficult projects. Much of the text serves to describe the pictures which show typical undertakings of the firm, or different departments and processes within the facilities. Some of the applications for all industries shown are a heat exchanger, trash racks, manifold, brew kettle and vent stack, heat and deaerator tank combination, brewery hop strainer and pipe fittings for pulp and paper industry. *Puget Sound Fabricators, Inc.*

. . . for your copy, circle No. 161

SMOOTH TRAVEL right down the line...

with *Barry* pulleys



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Packed with information on all types of Barry solid and split steel conveyor pulleys and Barry lagged pulleys. Send for your free copy now!

It's a fact! Smoother and better *all around* conveyor performance is yours when Barry Pulleys are part of the system — whether general, package, portable or production line. And there's good reason . . .

Barry Conveyor Pulleys, with regular or "Quick Detachable" taper bushed hubs, absorb the repeated demands of heaviest work loads without wear and tear on crowns, bearings and other components! Also, *electric welded* end discs keep out moisture and dirt which shorten the service life of other pulleys.

Because Barry Pulleys mount up closer, they form a truly inflexible assembly. And because their design permits ideal lateral alignment, they fit on shafts properly and firmly, without working loose.

Whatever the conveyor application, remember: *better performance records ride on Barry Pulleys!*

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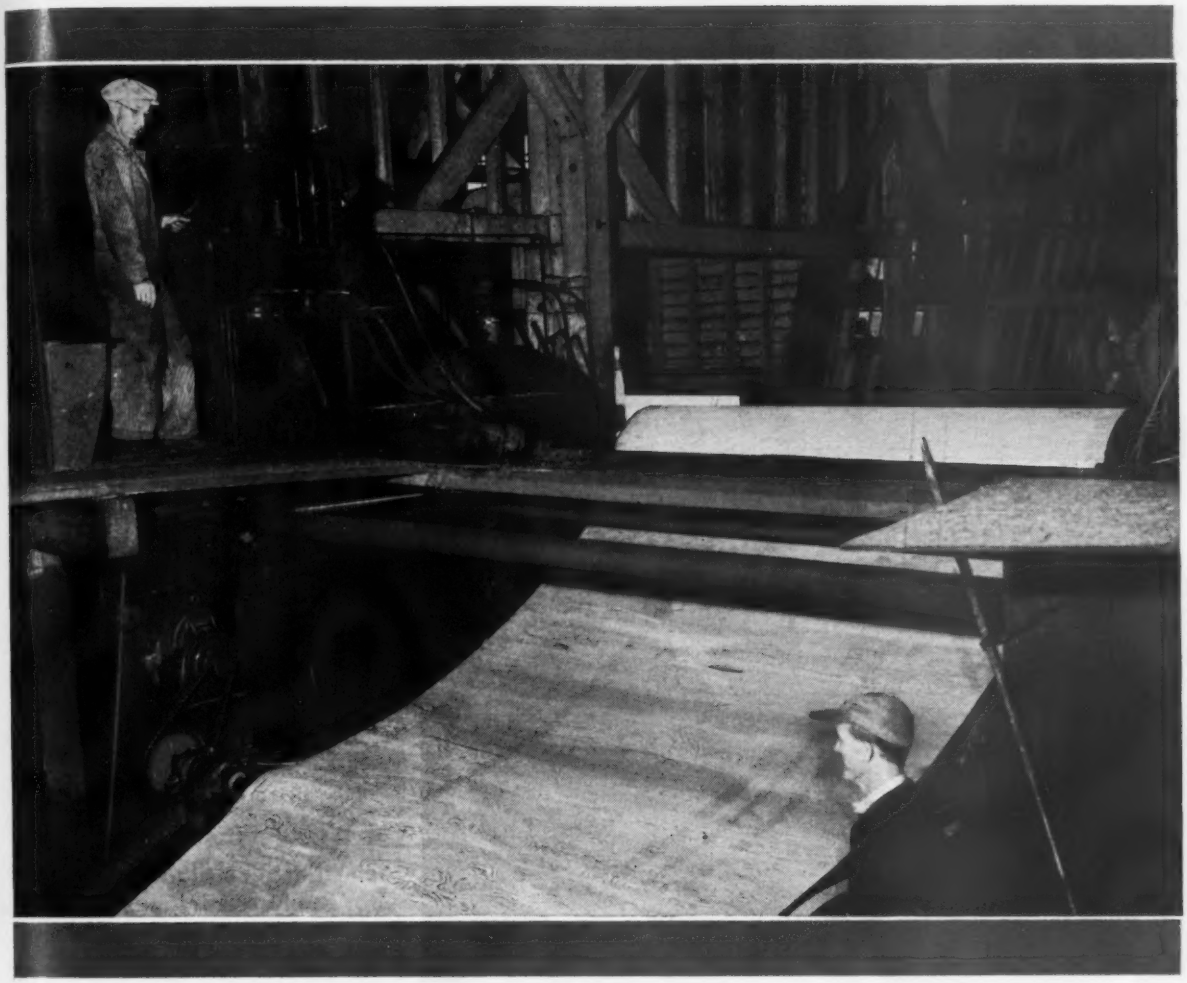
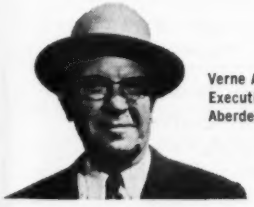


"UNOBA GREASE...general purpose lubricant at Aberdeen Plywood"



Verne A. Nyman
Executive Vice-President & General Manager
Aberdeen Plywood Corp., Aberdeen, Washington

"Union's UNOBA Grease has been the general purpose lubricant in this plant for more than three years, and we're well satisfied with it.

"A good example of UNOBA'S effectiveness is the way it protects the knife trunnion bearings on our 10' Coe lathe —despite heavy loads and ever-present moisture conditions these bearings have never stuck since we started lubricating them with UNOBA Grease.

"Too, our records show that we use less grease since we switched to UNOBA, and we have been able to eliminate many other lubricants that were previously considered necessary. The maintenance men and operators tell me that UNOBA works easier in their guns and hangs together better than any grease they know of... that it's equally effective in high speed bearings as it is in the hog and lathe bearings that take the poundings."

Aberdeen Plywood Corporation, one of the world's largest plywood and veneer producers, is one of the hundreds of important manufacturing concerns served by Union Oil Company of California. A Union Oil engineer with specific answers to lubrication problems peculiar to every industry is as near as your phone.

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... for more details, circle No. 75 on Reader Service Postcard

Towmotor offers kit for plant safety

Plant safety and its importance in material handling operations is emphasized in a helpful kit of specially prepared safety aids designed to add extra emphasis to industrial operators' own plant-wide safety programs. It includes a guide booklet on correct lift truck operation, a set of 11 x 14-in cartoon posters for display, and a group of colorful directional and warning signs for improving traffic flow in congested areas, thus reducing accidents. *Towmotor Corp.*

. . . for your copy, circle No. 162

Facts on welding fittings and forged flanges

A pictorial index that has a picture of each item alongside its description, ordering number and page location, is a feature of this 32-page catalog about steel butt welding fittings and forged steel flanges. The clear identification method is repeated on each page with complete specifications on elbows, returns, tees, caps, reducers, lap-joint stub ends and flanges, and includes a detailed sketch of each item. *Clyde Tube Forgings of America, Inc.*

. . . for your copy, circle No. 163

Complete catalog of grinding wheel products

Nearly 90 pages of prices, specifications and grades of grinding wheel products show you how to select and order the right items for your use. It covers grinding wheels for general service that include a variety for welding shops and for cutting off; woodworking industries, and for foundries. Interspersed throughout the book are blank note pages so you can compute prices and quantities according to the system clearly outlined. All needed data, plus detailed sketches of the many products, are included. *Pacific Grinding Wheel Co., Inc.*

. . . for your copy, circle No. 164

Data on new magnetic drives

Data on design, drive features, operating and performance curves, and output torque rating-dimensions are presented in this booklet on Whitney Tormag magnetic drives. It features a selection chart listing eight models, and has pictures of installations and applications. It completely describes the line's new self-contained permanent magnetic drives, fitting new NEMA frame specifications with a range in horsepower from 1 to 15. *Whitney Chain Co.*

. . . for your copy, circle No. 165

Electrification plan for monorails, cranes

Technical data on Shok-Pruf electrification for new and existing monorail and crane systems is presented in this comprehensive bulletin. Design advantages such as easy erection, wear-resisting slide collectors, and construction that provides trouble-free operation are explained. Detailed blueprints with dimensions give further helpful data, and complete specifications for component parts are included. *The Louden Machinery Co.*

. . . for your copy, circle No. 166

Facts on Towveyors and Tow-Conveyors

Application potentials of these two material handling systems are pointed out in the dozens of case history pictures this 42-page catalog features. It gives complete details on design and construction of the conveyor systems, including typical layouts, engineering drawings for each part, and installation information. Components for each system such as carts, chains, roller curves, trolleys, wheels and others are pictured and described. *Jervis B. Webb Co.*

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Design manual gives tips on stud welding

How to take advantage of savings possible with stud welding is told in this 24-page design manual. Full descriptions and physical properties of the various stud types are presented, including facts on the new standard "CP" stud recommended for most applications where a straight threaded stud is needed. Blueprints, photos, tables and graphs add to the manual's clarity. *Nelson Stud Welding Div. of Gregory Industries, Inc.*

. . . for your copy, circle No. 168

Book tells you how to choose screw conveyors

The recently-introduced line of shaft-mounted Screw-King speed reducers described in a catalog that simplifies selection of drives for screw conveyors. By following the clearly outlined directions and using the detailed tables, a complete drive can be designed in a matter of minutes. Designed exclusively for screw conveyor applications, units are available in three reduction ratios—5 to 1, 13 to 1 and 20 to 1 for screw conveyors requiring up to 10 hp., and speeds from 15 rpm. to 290 rpm. *The American Pulley Co.*

. . . for your copy, circle No. 169

500 vinyl plastic pipe markers in catalog

Here is an 8-page guide to selecting the best self-adhesive pipe marking materials. Self-adhesive cut-out numbers and letters, plus stock safety slogans widely used by safety engineers are completely described and illustrated. Facts are included on many other self-adhesive products used by plant maintenance men and engineers. *Printed Cellophane Tape Co.*

. . . for your copy, circle No. 170

SCREW DRIVERS

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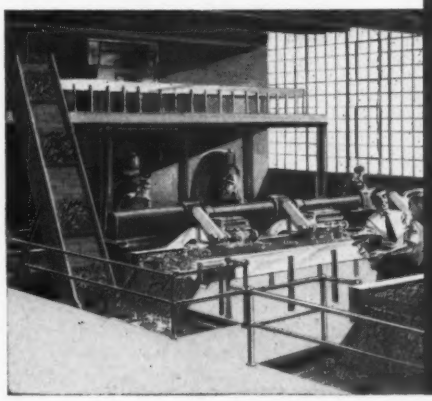
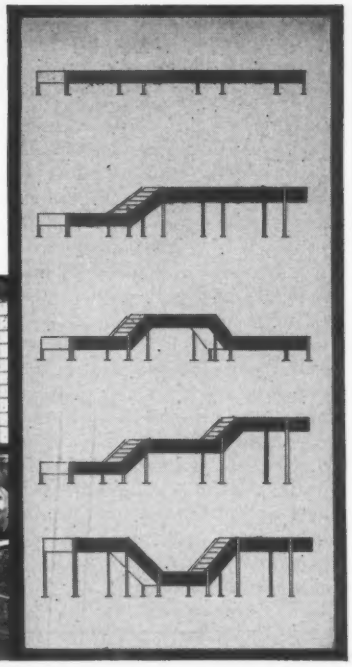
CONVEYOR STANDARDIZATION





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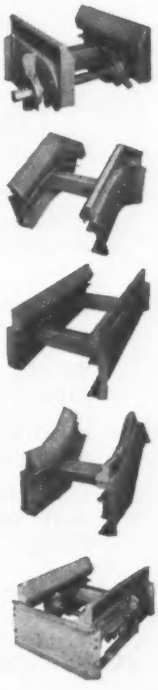
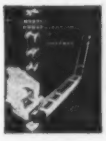
Here is a conveyor program designed for the unusual. NOW . . . you can have a customized conveyor today to meet production needs . . . and with modification, that same conveyor will meet the needs of tomorrow.

The May-Fran conveyor standardization program provides the standard components that can be assembled to form a special or standard conveyor. These same components can be re-arranged at any time to solve production problems in the future.

In addition, standard components mass produced mean conveyor economy right from the beginning.

Here is a conveyor program of standardization program that saves you money now . . . and in the future!





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7320-MF

MAY-FRAN ENGINEERING, INC.

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. . . for more details, circle No. 78 on Reader Service Postcard

Engineering data on Poly-V belt drives

A useful tool if you're concerned with industrial belt drive design or maintenance is this 112-page book of information, charts, tables, diagrams and specifications. Selection of proper poly-V belts and sheaves for drives of any speed or hp. rating is made easy, without calculation, by use of the handy tables. Complete coverage of both theory and practical application of the firm's new drive is provided, plus several illustrated case histories. A valuable aid to design and maintenance engineers, it includes comprehensive data on hp. ratings, installation instructions and trouble shooting. *Raybestos Manhattan, Inc., Manhattan Rubber Div.*

. . . for your copy, circle No. 171

Manual makes electric motor selection easy

Selection made easy is the point of this 12-page application guide about electric motors for all popular applications. Here's how this handy manual can be used: First, the reader selects from given tables the kind of equipment or machinery to be driven. Next he identifies character of load, speed of operation, starting and running torques, surrounding atmosphere, frame type and speed. This gives him the right motor for his specific need and the chart tells the motor type, dimensions and other pertinent data. *Century Electric Co.*

. . . for your copy, circle No. 172

Details on all phases of air control

Filtering, heating, ventilating, cooling and dust control are discussed in this presentation about a firm that manufactures products for all these fields. A partial listing of their products shows 35, with a picture of each, including portable heaters, blowers, centrifugal fans, engineering valves, cooling coils, lint and air filters, etc. Sections in the book are devoted to each of the air control fields. *American Air Filter Co., Inc.*

. . . for your copy, circle No. 173

Inside story on heavy duty Remco cylinders

A four-page brochure, emphasizing a cutaway drawing for emphasis, gives the inside story on advantages and engineering data on a line of heavy duty air-hydraulic cylinders. A blueprint drawing to assist you in giving correct information when ordering is supplemented by a table of cylinder dimensions in inches. A brief description and picture are also given for the company's telescopic hoists for dump trucks, oilfield masts, high tower platforms and other applications. *Remco Mfg. Co.*

. . . for your copy, circle No. 174

Hydraulic lift trucks for "in-between handling"

Latest developments in the Big Joe line and factual information on that complete line of manually propelled, battery-operated hydraulic lift trucks are covered in a 24-page catalog. Also featured is the full story on "in-between handling" — the firm's concept of applying hydraulic handling to every department to achieve maximum handling potential with utmost economy. The catalog gives basic information on the Challenger—mass-produced 1,500-lb. capacity lift truck—as well as on various straddle type units and the direct-pallet approach Counterweight units. *Big Joe Mfg. Co.*

. . . for your copy, circle No. 175

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Air & Hydraulic Cylinders

New design eliminates weak points

- ★ NO TROUBLESOME TIE RODS OR SNAP RINGS
- ★ CAST STEEL CYLINDER HEADS, "O" RING SEALED. NO BROKEN HEADS OR CLEVISES.
- ★ POSITIVE CUSHION CONTROL. NO BANGING CYLINDERS.
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Dependable
TELESCOPIC CYLINDERS
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3-40 ton capacities

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Standard or custom made

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"77% greater production using P&H Zip-Lift Hoists"

—reports Wisconsin Motor Corporation

Outstanding production increase coupled with maximum safety

Production rates were boosted and work eased when P&H Zip-Lift® hoists were installed at The Wisconsin Motor Corporation. For example, on one operation, crankshaft milling, "—average output was 15 pieces an hour at a labor cost of 21¢ per piece. Now, using one P&H Zip-Lift, production has increased to 26½ pieces per hour — or 77%. We save 9¢ per piece on labor alone, or $16.66 on each 7-hour shift."

Other records reveal similar increased efficiency and safety wherever each of the 9 Zip-Lifts used by this company is located.

P&H top performance is coupled with maximum safety. In over three years operation, Wisconsin Motors has never had an accident with a P&H Zip-Lift. What's more, the press of a button replaces manual lifting . . . eases labor . . . lowers fatigue.

Find out how P&H Zip-Lift electric hoists can help save you time, labor, and money. Write today for Bulletin H-20. Department 206L, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

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built to give dependable trouble-free service on all jobs

RUBBER TREADS . . . a wide choice of treads suited to all types of floors, including Darnelloprene oil, water and chemical-resistant treads, make Darnell Casters and Wheels highly adapted to rough usage.

RUST-PROOFED . . . by zinc plating, Darnell Casters give longer, care-free life wherever water, steam and corroding chemicals are freely used.

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STRING GUARDS . . . Even though string and ravelings may wind around the hub, these string guards insure easy rolling at all times.

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. . . for more details, circle No. 81

Buyer's guide for GE instrument transformers

Price and product information for buying instrument transformers is given in this 90-page guide that lists ratings, ASA accuracy classifications, specifications and catalog numbers on current and potential units, indoor and outdoor. It covers metering outfits, portable transformers and Thyrite protectors. Helpful data is presented on tests, mechanical and thermal limits, and replacements of previous transformer types. *General Electric Co.*

. . . for your copy, circle No. 176

Aircomatic cutting of non-ferrous metals

Development and applications of Airomatic cutting, new method for straight line and shape cutting of non-ferrous metals, are detailed in a 24-page informational pamphlet and catalog. The process, using standard Aircomatic welding equipment, varying only wire feed speeds, currents and arc, is outlined. The catalog contains tables for necessary fittings, several technical graphs, etc. *Air Reduction Pacific Co. Div., Air Reduction Co., Inc.*

. . for your copy, circle No. 177

Facts on welded steel conveyor pulleys

Conveyor pulleys of welded steel for belt conveyor and bucket elevator systems, as well as three types of lagging to use with them, are treated in Bulletin 5781. It includes facts on drum types and the self-cleaning wing types, with bolted hubs, or compression hubs, including the patented "FD" hub, and its particular design features. Types of lagging pictured and described are Hi-Grip, Super-Grip and Vulco-Grip. *Chain Belt Co.*

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Two reference books on zinc as galvanic anode

Developed as a result of a six-year investigation project are two reference manuals dealing with zinc as a galvanic anode underground, and as a galvanic anode underwater.

Dealing with the former subject is a 40-page book, with many tables and charts that discusses theory and practice of zinc anode application in transmission pipe lines, gas distribution systems, transmission line towers, ground rods, etc. The second book, on underwater aspects, has 16 pages of text describing the way zinc anodes protect marine craft, water storage tanks, H piling in sea water, traveling water screens, etc. *American Zinc Institute, Inc.*

. . . for your copy, circle No. 179

Facts on industrial gas equipment and controls

Acetylene generators, industrial gas manifolds with automatic controls, and suitable line equipment are described and illustrated in this 24-page Oxweld catalog. It covers operational design features of the generators capable of delivering from 100 to 9,000 cu. ft. of acetylene per hr. *Linde Co., Div. of Union Carbide Corp.*

. . . for your copy, circle No. 180

Aluminum honeycomb and its structural uses

What Hexcel honeycomb is and how more and more industries are using it to give products greater strength and lighter weight is told in this informative brochure. Said to produce the greatest strength to weight ratio ever developed, the honeycomb method is used in a wide variety of aircraft applications, and also recommended and used for ceilings, curtain walls, etc. *Hexcel Products, Inc.*

. . . for your copy, circle No. 181

WHITMAN & BARNES

DRILLS

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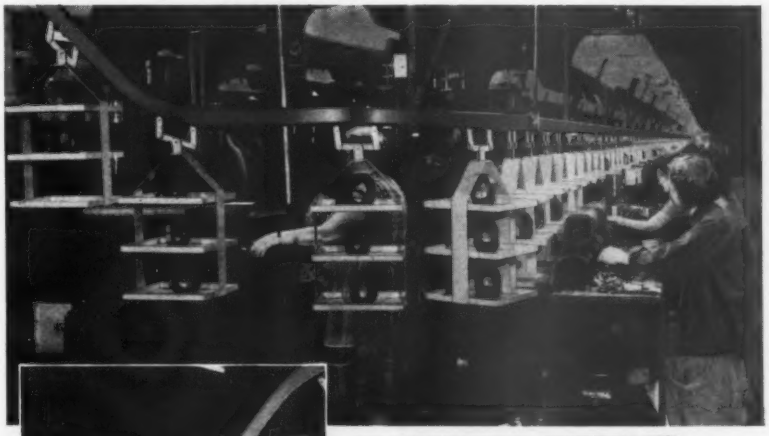
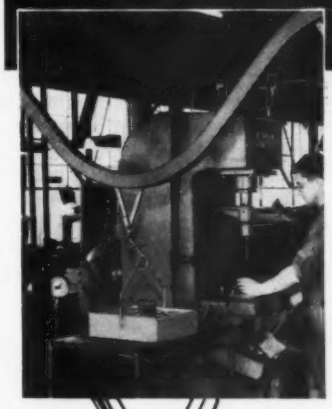
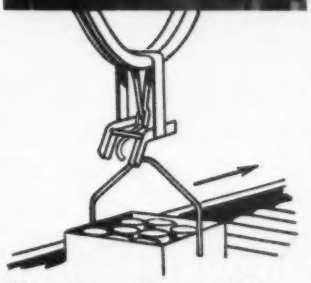
R-W "Zig-Zag"® CONTINUOUS POWER CONVEYORS

provide real AUTOMATION for COST-SAVING OPERATION & INCREASED PRODUCTION







The above photo and line drawing demonstrate how the R-W "Zig-Zag" Conveyor *automatically* picks-up full trays and *automatically* deposits them at the unloading station. Machine operator starts cycle by merely sliding full trays into the conveyor path.

The above photos illustrate how various materials handling problems on the machining and assembly lines were effectively solved, for an electric motor manufacturer, with R-W "Zig-Zag" Conveyors. "Stuffing-Trays" carry a continuous supply of work to assemblers seated on both sides of a huge bench and just as easily carry the finished assemblies on to other operations in the plant. This "Zig-Zag" system utilizes available overhead space to increase production efficiency and provides for a saving of valuable floor space. R-W "Zig-Zag" Conveyors are flexible, easy to install, easy to alter or expand, economical to operate and offer longer, safer, more efficient materials handling service on any production line.

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How to solve your pumping problems

Answers to your questions on rotary pumps and hydraulic pump-motors are given in two publications about Roper products. The first, on pumping problems, has 35 pages of technical data on subjects such as friction loss, cylinder displacements, viscosity, specific gravity and materials of pump construction. It presents three sample problems and has several conversion tables. The second offering is a 12-page catalog on pumps and pump-motors that describes the complete line of products, giving fairly complete specifications in compact form. *Geo. D. Roper Corp.*

. . . for your copy, circle No. 182

Fast and easy way to put in check valves

Durabla basic check units, which can be combined with any standard pipe fitting to form a complete check valve, are described in the eight-page booklet. It shows the unit used with a reducing bushing, 45-deg. el, side outlet, drain elbow, bend and standard elbow, as well as with tanks and pressure vessels. Pressure and temperature ratings are listed. The bulletin gives sizes and weights for the basic check units, vacuum breakers and reducing couplings, the latter used where a complete stainless-steel check valve is needed. *Durabla Mfg. Co., Inc.*

. . . for your copy, circle No. 183

Buying guide for solid tires

This dual offering consists of a multi-colored 16-page catalog with descriptions and illustrations of standard and special types of Monarch tires, plus a supplementary bulletin that serves as a reference guide for buyers. The catalog gives data on comparative performance tests, preventive maintenance recommendations for longer tire life, and complete size and specification data on Mono-Cushion and Universal tire lines. The 20-page booklet that is inserted in a pocket of the catalog's back cover lists current specifications for almost all makes of lift trucks and is a handy guide for buyers in selection of proper solid tire types and sizes for specific trucks. *The Monarch Rubber Co.*

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He does his job three times as fast with a Robinson . . . the original and first quality wire twister. He saves two thirds the time it used to take to safety wire. Your labor force can do the same . . . save you up to $144.00 on every engine wired, if you will provide them with this Robinson 3-way tool: plier, cutter, twister.

ON EVERY ENGINE HE SAFETY WIRES

WRITE TODAY FOR THIS FULLY ILLUSTRATED BROCHURE

Complete details are yours in this colorful new brochure. Write to Ralph C. Robinson Co., Inc., Dept. IB, 2516 Crosby Way, North Sacramento 15, California.

THE ROBINSON WIRE TWISTER

. . . for more details, circle No. 86

here's the
for Chain Drive users
FREE
answer to better low-cost power transmission...
Write today for the first really Engineered approach to the problem of supplying custom sprockets "off-the-shelf" . . . .
cullman
your shaft size + bushing + sprocket = Grip-Master stock delivery
Low installation cost Low maintenance cost All sizes in steel No extra machining needed!
cullman
POWER TRANSMISSION ROLLER CHAINS AND SPROCKETS
CULLMAN WHEEL COMPANY, 1337 ALTGELD STREET, CHICAGO 14, ILLINOIS

. . . for more details, circle No. 87 on Reader Service Postcard

. . . for more details, adv. opp. pg., circle No. 147 on Reader Service Postcard

BETTER FASTER

Low Temperature EUTECTIC WELDING ALLOYS

STRONGER WELDS

EUTECTIC Welding News

PUBLISHED BY EUTECTIC WELDING ALLOYS CORPORATION, 40-40 172 STREET, FLUSHING 58, NEW YORK, N. Y.

"EUTECTIC" WELDING HEADLINES • TIME • MONEY • MACHINERY SAVERS

XYRON 2-25 REPAIRS RR DIESEL ENGINE SAVES $10,800, WEEKS OF DOWNTIME

A large break in the first cylinder of a 600 horsepower diesel engine almost resulted in the loss of $10,800 by a Midwestern railroad. Attempts to repair the engine with conventional high heat welding materials failed because the block was thoroughly dirt and oil soaked and its tremendous size made pre-heating impossible.

Fig. 1

The railroad's maintenance foreman was ready to recommend scrapping the engine when Eutectic's District Engineer suggested welding with patented Xyron 2-25, "Eutectic's" newest and most advanced electrode for all types of grey and alloyed cast iron. Xyron 2-25 is usable fast and cold and is the first non-cracking, porosity free, all position electrode for cast iron.

Fig. 2

Repair was begun by veeing out all broken surfaces with Eutec-ChamferTrode, high speed gouging electrode for all metals. (Fig. 1) Gouging with ChamferTrode provided a good surface for deposits of Xyron 2-25 and burnt out many of the impurities in the casting. After the broken parts were reassembled on the engine block, Xyron 2-25 was used to tack weld. (Fig. 2).

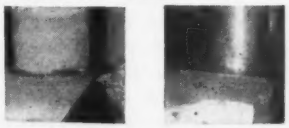
Welding machine was set at 100 amps, DC reversed. The weldor then used a stringer technique with short arc to deposit 2" passes of Xyron 2-25. Peening after each pass relieved stress and slag was easily removed.

Final results were excellent. Xyron 2-25 produced dense, smooth, porosity free deposits at lowest amperages. (Fig. 3) Fast repair with Xyron 2-25 saved railroad $10,800 replacement cost and avoided weeks of downtime. *(A-71)*

HIGHEST STRENGTH JOINTS WITH EUTECTRODE 201

Welded with patented EutecTrode 2101, the aluminum tine joints on this cement block unloader are up to three times stronger than joints of conventional aluminum electrodes. Loads of close to a ton cause the tines to dip as much as eight inches without cracking. EutecTrode 2101 quickly fabricated the block unloader, produced smooth solid deposits with good color match and high resistance to corrosion. The first aluminum electrode with an extruded flux coating, EutecTrode 2101 does not spatter or fume, produces a quiet arc at lowest amperages. EutecTrode 2101 outperforms all conventional aluminum electrodes. *(A-72)*

EUTECTRODE 680 AC-DC AVERTS 10 WEEK STOPPAGE



A Tennessee stamping plant faced an 8-10 week production stoppage because of a cracked shaft on a 340 ton press. Replacement was estimated at $15,000. But downtime was averted and replacement cost saved by using EutecTrode 680 AC-DC and Eutec-ChamferTrode to repair the shaft at a cost of only $37 in materials. Eutec-ChamferTrode, high speed gouging electrode, was first used to vee out the crack, which extended 6" through the 12" shaft. EutecTrode 680, patented high tensile electrode for very high alloy and carbon steels, was then applied. Eutec-Trode 680 welds were applied at lowest amperages. *(A-73)*

In answering industry's requests for technical data, Eutectic's research and engineering staffs help industry save thousands of dollars each year. Your questions, like these below, will be answered without obligation by Eutectic's Technical Information Service.

Q. My company's welding manual makes reference to the use of solder in the repair of lamp socket contacts. EutecRod 157 with Eutector Flux 157 was recommended to us for this application. Will you advise? We would like to incorporate this information in our manual for future use. The fact that this soldering is performed by unskilled personnel should be considered.

A. EutecRod 157 is considered an ideal recommendation. Since this alloy has an extremely narrow plastic range, rapid solidification takes place, assuring a good build-up. It is therefore easier to handle by the unskilled. Deposits are harder and have higher electrical conductivity than conventional solders. This means greater resistances to pitting and general wear. Since the alloy has a higher solidus temperature, the possibility of plasticizing the build-up if accidental arcing occurs is virtually eliminated. Contacts also will remain bright and clean since EutecRod 157 does not contain lead or other elements than darken with age. Melting point is approximately 430° F. Electrical conductivity is 18 percent.

Q. What is the electrical resistance of EutecRods 180, 800, and 1804?

A. Electrical resistivity of all three is almost identical in that values of 23/24 microhms per cubic centimeter are obtained on all tests.

Eutectic Warehouse—Service Centers
1108 Blake Street, Berkeley 2, Calif.
1414 South Street, Phoenix, Arizona

Eutectic Welding Alloys Corporation
40-40 172nd Street, Flushing 58, N.Y.

Gentlemen:

I would like further free information on the following:

☐ A-71 ☐ A-72 ☐ A-73
☐ Free 170 page pocket Welding Data Book

Name_____

Business Address_____

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NEW EQUIPMENT for Western plant operation, production, and maintenance

USE RIP-OUT POSTCARD, page 123, for more information on products described.

FREE $15.50 WIRE TWISTER
. . . if you describe a new application

Get any ideas from these close-ups of the wire twister? If so, jot 'em down . . . your suggestion may pay off!

If you have a production or maintenance operation that calls for wire twisting, and you're now doing it by hand or makeshift tool, here's your chance to obtain free a tool that will do the job automatically and reduce your labor costs by an estimated 60 to 70%.

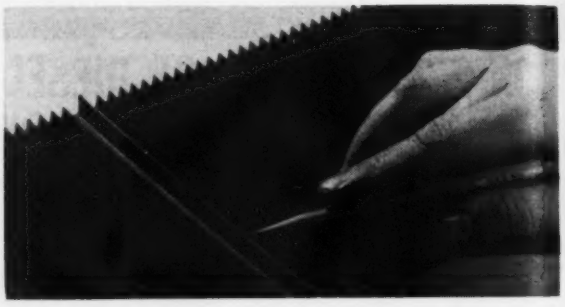
Take a look right now at the tool pictured above (it's the just-developed Robinson "Jet Model M84" —a simple to operate but precision tool that, when the knob is pulled, makes an infinite number of turns in the wire without releasing its grip.) Then, jot down a brief description of the production wire twisting job you have in your plant where the tool could be used. Send your description to the manufacturer— *Ralph C. Robinson Co.*, P. O. Box 3094 North Sacramento 15, Calif. If the wire twisting job you describe is one of which the firm has not previously been aware, they will promptly provide you with one of the tools free.

The first automatic wire twister was developed by Robinson to cut the labor time needed to safety-wire aircraft engines. Now, it's become a "must" in just about every aircraft plant in the country. But the manufacturer knows that there are probably hundreds of other wire twisting requirements throughout industry. Typically with a new tool development, the problem is to locate these many and diverse applications. That's the background of this special offer, made exclusively through WESTERN INDUSTRY.

If you want more facts about the tool before you send your application idea to the manufacturer, circle No. 185 on this month's Reader Service Postcard.

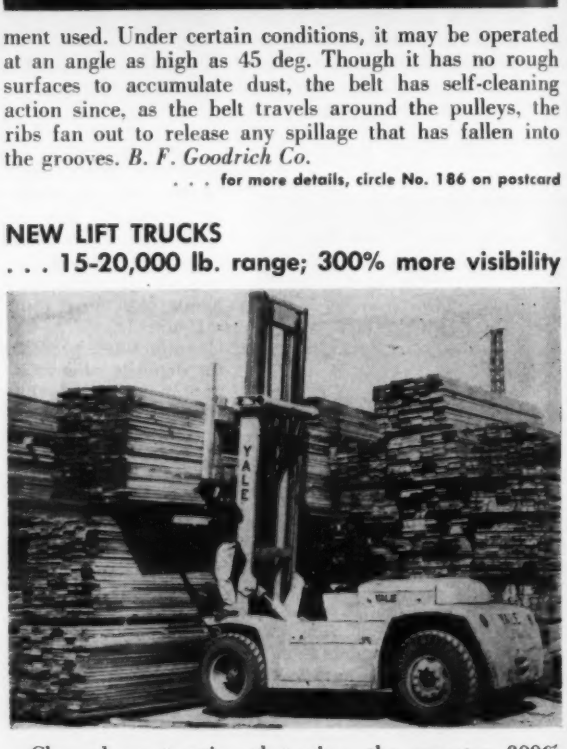
RIBBED CONVEYOR BELT
. . . for steep angles, light or heavy packages

A series of inverted V-shaped ribs that grip cartons in either incline or decline operations make this new Griptite rubber belt equally effective for conveying lightweight packages or heavy cartons. Extra protection for holding extremely light packages in place is provided by 3/8-in. raised ribs or cleats (also inverted V-shaped) spaced 18 in. apart. Standard ribs are 1/4 in. high and spaced four to the inch. Incline angle of the belt depends on weight size and surface of the box carried and the type of equipment used. Under certain conditions, it may be operated at an angle as high as 45 deg. Though it has no rough surfaces to accumulate dust, the belt has self-cleaning action since, as the belt travels around the pulleys, the ribs fan out to release any spillage that has fallen into the grooves. *B. F. Goodrich Co.*



. . . for more details, circle No. 186 on postcard

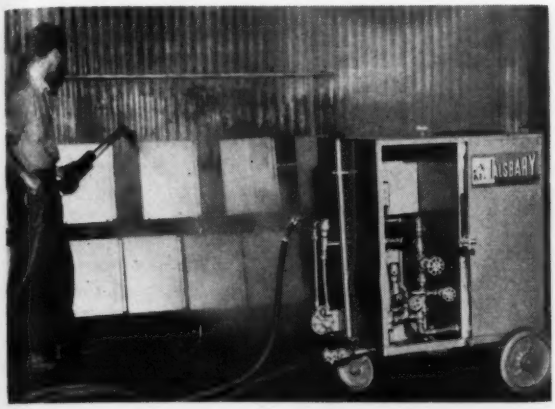
NEW LIFT TRUCKS
. . . 15-20,000 lb. range; 300% more visibility



Channel construction that gives the operator 300% greater visibility, previously unobtainable load stability, and the fastest possible cyclic rate of operation within safety limits are among the features in a new line of gasoline-powered, pneumatic tire lift trucks. Said to mark the first major design advance in such trucks since 1938, the new series comes in 15,000, 16,500, 18,000, and 20,000-lb. capacity models with either gasoline or LP-gas, using either a straight friction clutch, or fluid coupling, transmission. The channel design uses two widely spaced lift cylinders and nested channels, with chains in front of the cylinders, and cross members at each end that leave a maximum lateral opening for visibility. Mounting of the forks to extend 12 in. below the bottom carrage bar, the high and centered seat of the operator also add to up to better seeing. Use of the nested channels and lifting cylinders gives a broad base for lifting force and load stability. *The Yale & Towne Mfg. Co.*

. . . for more details, circle No. 187 on postcard

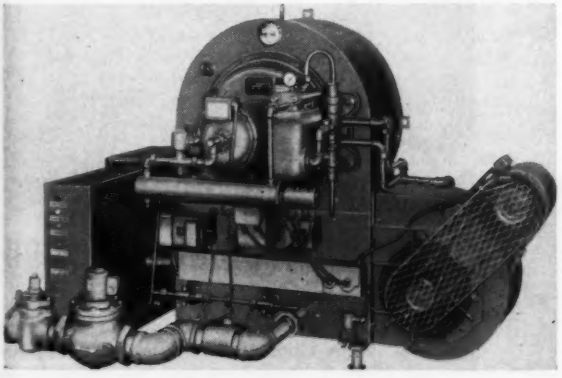
FIRELESS STEAM CLEANER
. . . has "easy-squeeze" nozzle control



To stop or start flow of solution in this cleaner, the operator simply squeezes or releases his grip on the easy-squeeze gun affording control of operation from stations removed from the cleaner. Using live steam from a plant's regular steam lines, it has a variable volume pump that balances capacity to available steam, enables user to get up to 200 gph. of cleaning solution at 100 psi. Its high velocity, 212 deg. solution cleans hard-to-reach corners and crevices; washes away grease, gum, syrup and corrosives from vats, racks, machinery, etc.; sterilizes, deodorizes, and disinfects. It can be used for simultaneous degreasing and phosphatizing. *Malsbary Mfg. Co.*

. . . for more details, circle No. 188 on postcard

FORCED DRAFT BURNER
. . . for combining into boiler-burner unit

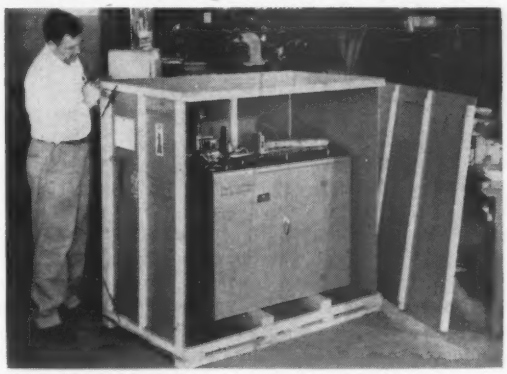


This factory assembled unit is designed to be combined with any type boiler for forced draft operation to form an automatic "packaged boiler-burner unit," for high or low pressure steam or hot water heating, with maximum rated capacities from 90 to 750 developed output horsepower. Specifications may be chosen to burn any grade of fuel oil from No. 2 to heavy No. 6 or Bunker C, high or low pressure gas, or combination units. The compact unit includes the burner, belt-driven forced draft fan with speed adjustments, windbox with integral refractory, enclosed control cabinet, and ignition and electronic safeguard system. All components are wired and piped ready for installation and only steam, water, electrical and fuel connections need to be made at the job site. Pictured is type FDL, standard for use on Scotch Marine boilers. *Ray Oil Burner Co.*

. . . for more details, circle No. 189 on postcard

AIR FORCE APPROVED SHIPPING CONTAINER
. . . 80% savings in assembly, disassembly

This Air Force approved Evans shipping container will solve your packaging and shipping problems and offers you savings of 80% in assembly and disassembly (one or two minutes by unskilled help), greater structural strength while using fewer structural members, lighter tare weight because of less material used, perfect 45-deg. diagonal bracing on the corners as a built-in standard feature, use of only half as much steel strapping, and full advertising values as a "traveling billboard," with its smooth

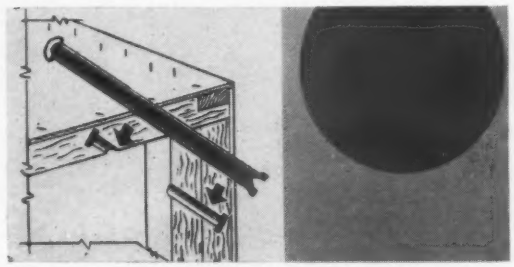


HEAVY YET DELICATE machinery is shipped in Evans containers with no inside packing required. Items ranging from 300 lb. to one ton have been shipped in crates. Metal locking spindle is being inserted by shop man in one easy operation.

side panels which permit unobstructed signs or other important product or company identification while in transit or in storage. Packed containers can be stacked to the ceiling.

In addition, this container uses no nails in assembly, can be shipped and stored knocked-down, has interchangeable parts, and it can be built with a pallet base as an integral part of the container itself.

The patented method of closing and bracing these containers increases their structural strength while eliminating the use of any nails, screws, clamps or other fasteners in assembly. These unique containers are assembled, locked, and braced in one swift and

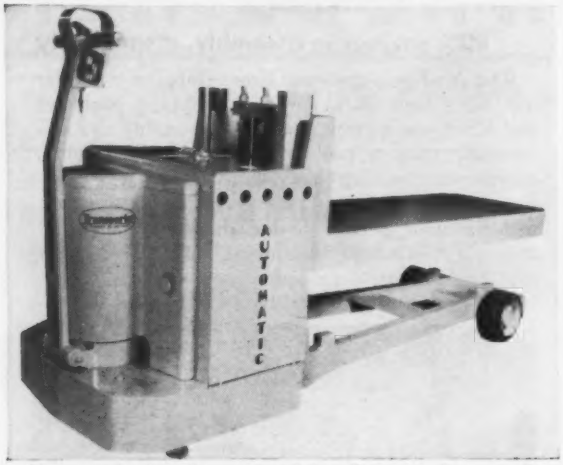


HOW CONTAINER GOES TOGETHER is shown by line drawing. Right half of photo shows the cross-section of the over half-round slot. When the spindle is placed into the 45-deg. diagonal slots and rotated ¼ turn, it effectively locks the crate in one fast motion.

easy operation that requires no special tools and no skilled help. This operation consists merely of inserting a tubular metal spindle into the perfect 45-deg. slots that are designed into eight corners of each container. *Evans Container Corp.*

. . . for more details, circle No. 190 on postcard

HI-SKID TRANSPORTERS
. . . trucks with 20 and 24½-in. lifts



Now ready for the material handling market are four models of platform walkie-type industrial lift trucks, WWHY-4 and 6, and WWLY-4 and 6, redesigned to calculate weight distribution for overall stability. The 4's have a capacity range of 4,000 lb. up to 54 in. of platform length and the 6's range is 6,000 lb. up to 48 in. In the WWLY models of both capacities the platform is 6½ in. in lowered position, giving a lift of 20 in., while the other two models have an 11 in. platform and raise loads up to 24½ in. The 4's have single steel or rubber wheels, the WWLY 6 has just single steel and the fourth is made with single steel or dual rubber tires. Other features include switch plate on the steering handle to provide three forward speeds and one reverse; electric horn push button; and drive brake that is spring applied and cam released, with external contracting type shoes. *Automatic Transportation Co.*

. . . for more details, circle No. 191 on postcard

ALUMINUM STAIR TREAD
. . . cuts maintenance, gives safer footing

Answering the demand for a stair tread that requires no costly protective coatings is a recently marketed precision-cast aluminum stair tread for use in industries where stairs are subject to extreme weathering or corrosive atmospheres. Combining safer footing for workers with long-term maintenance savings, the tread utilizes a slip-proof surface nosing of fused aluminum oxide abrasive metallurgically bonded to aluminum plate, while high corrosion resistance and strength is afforded by the high special aluminum alloy. Dirt won't collect in the rounded, joint-free corners. Because the grating is one piece, concentrated loads are distributed evenly, permitting weight over 3,000 lb. Three finishes available are structural, polished, and marine. Sizes are from 24 to 42 in., long and standard 10 in. wide, although special widths are obtainable. *Aluminum Co. of America.*

. . . for more details, circle No. 192 on postcard

Bob Wagner
Chief Engineer
Hiller Helicopters, Palo Alto, Calif.—Manufacturers of Hiller Designed Vertical Take-off Aircraft

Our Telephone Opens New Horizons in Product Design

"New concepts in design, like the Tilt-Wing Propelloplane, take a lot of planning . . . and telephoning. With Conference Calls, for example, we link Project Engineers and executives from coast to coast on the same telephone line. And every day we coordinate work on big contracts with a few out-of-town phone calls. We might otherwise have spent weeks and several thousands of dollars on travel."

Opening new horizons for all kinds of products is one of many ways in which the telephone is helping firms like Hiller become leaders in their fields. We'd like to suggest other ways to make out-of-town calling more profitable for you. Our staff of Long Distance specialists is at your service. Just call your telephone business office.

Working together to serve you better

Pacific Telephone

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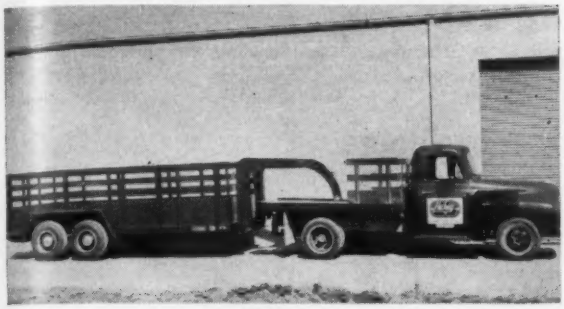
VERSATILE TRAILERS
. . . turn one light truck into versatile fleet



You can transport big pay loads with one light truck by combining it with one or several Nuway platform trailers that have a unique coupling which disconnects truck and trailer in less than two min. Economical, versatile, durable, there are steel platform models with wide racks and wheel housing, or with a full flush deck, and other van types of steel or aluminum. The coupling can easily and quickly be removed from the truck bed if desired. The loading height is only 22 in. off the ground; standard length is 16 ft., standard widths, 92 and 96 in. The firm offers a complete design and fabrication service for specialized trailers for your particular requirements. *Locomotion Engineering, Inc.*

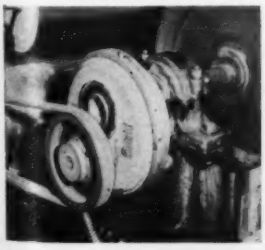
. . . for more details, circle No. 193 on postcard

MAGNESIUM DOCK BOARDS
. . . adjust to floor levels automatically

A practical answer to cost problems that go with permanent type dock levelers is presented with Perma-Docks—a complete line of standard magnesium dock boards to be installed on concrete docks. Self-adjusting automatically to truck or trailer floor levels, they are designed for minimum set-back; swing up and out of the way when not in use. Lightweight and easy to handle, the docks have special safety curbs for power truck tire protection, crowned design that prevents hang-up of low underclearance equipment, flared curb ends for safe wide angle turns, and beveled edges to avoid load jar. Optional equipment includes electric-hydraulic system for fully automatic operation. The company states that Perma-Docks can be installed at about 60% cost savings, and also provide maintenance-free operation. *Magline, Inc.*

. . . for more details, circle No. 194 on postcard

FIVE TO ONE SPEED REDUCERS
. . . shaft-mounted, single-reduction



Four new Shaft-King units available provide a speed range from 60 to 350 rpm. with use of fixed or adjustable-speed wedgbelt drives, handling loads up to 25 hp. Sizes are for shafts up to 2, 2 3/16, 2 7/16, and 2 15/16 in. diameter, and all units are sold

hammers ½" holes 3¼" deep in concrete in 60 seconds!

Milwaukee
Model H-834A
¾" electric
hammer

Most power per dollar!

Milwaukee's Model H-834A hammers up to ⅞" dia. holes in concrete at 3000, 100-lb. blows per minute!
For example, it hammers ½-inch holes 3¼" deep in standard mix concrete in 60 seconds. And **Milwaukee** quality is unmatched at any price! **Milwaukee**-built heavy-duty motor. Chrome-nickel steel gears. All ball and roller bearings. Minimum vibration.

The H-834A — with 12 assorted star drills and chisels, chuck, drift key, grease gun, grease and steel carrying case . . . . only $137.50 net
Model H-834 with limited set of accessories $122.50.

For free demonstration see your Milwaukee Distributor, or write for folder EH-2.

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Main Plant and Office
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LOS ANGELES
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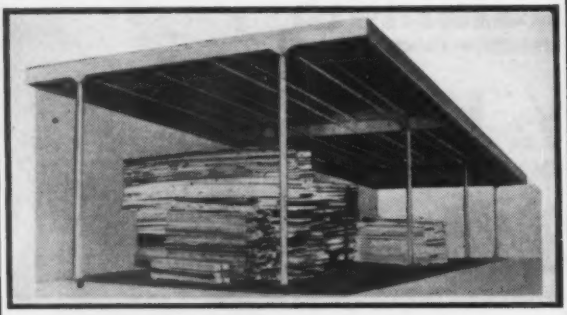
SAN FRANCISCO
1552 Howard Street

Milwaukee

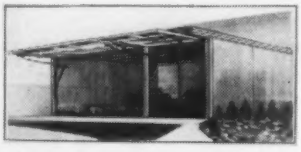
. . . for more details, circle No. 90 on Reader Service Postcard

EXPAND YOUR FACILITIES AT LOW COST!



CONVERT DEAD YARD SPACE INTO WORK AREA IN HOURS . . . NOT DAYS

Wilco All-Purpose Shelters Protect Materials, Men and Equipment. Increase Production.



Open or Enclosed . . . Permanent or Portable, Nut and Bolt Assembly Permits Quick and Easy Erection.

Flexibility of Design Permits Rapid Change-overs as Required.

CHECK THESE FEATURES . . .

- ★ FITS ANY SPACE REQUIREMENT
- ★ OPEN OR ENCLOSED
- ★ PERMANENT OR PORTABLE
- ★ ADD SECTIONS, any time, to expand
- ★ ONLY 3 HOURS TO ASSEMBLE
- ★ LOW COST—due to volume production
- ★ LEASE OR SALE
- ★ FINANCING

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Write today, and get more facts about Wilco All Purpose Shelters

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City ..... Phone .....

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equipped with standard adjustable-torque arms. Features of the series, as for all the speed-reduction drives in the line, include compactness, low cost, installation ease, no need for special mounting stand, inter housing that provides permanent gear and bearing alignment, and continuous splash lubrication. *The American Pulley Co.*

. . . for more details, circle No. 195 on postcard

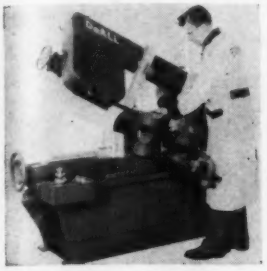
PORTABLE BOOM
. . . adapts to unlimited levels, 26-deg. inclines

Suitable for truck loading or warehouse piling, this boom features a discharge end that may be supported in many ways. It comes in three lengths 11, 16 or 20 ft.—with either 14- or 20-in. belting, and can be used as part of a flexible conveyor system or for assembly table operations. *Standard Conveyor Co.*

. . . for more details, circle No. 196 on postcard

. . . for more details, circle No. 92 on Reader Service Postcard

LOW-POWERED SAW
. . . to solve your maintenance shop needs



Nearly foolproof construction so that unskilled workers can operate it, and rapid set-up and operation to save time of skilled workers are features that make this low-priced saw ideal for maintenance shops. Able to handle 12 in. rounds, 12 x 12 in. square stock, and work weighing up to 1,500 lb., Model C-12 provides four speeds by means of step pulleys, so that you may select one for the principal cutting work, yet have a range available for more critical jobs. The built-in coolant system and hydraulic band tension control assure long blade life and rapid cutting. Controls and operational procedure are simple. *The DoAll Co.*

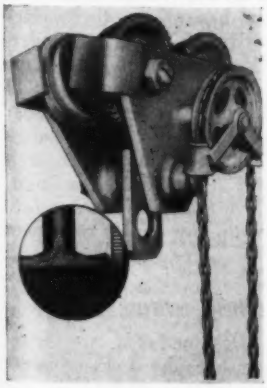
. . . for more details, circle No. 197 on postcard

VAPOR SPRAY DEGREASER
. . . processes over 1,000 lb. of steel per hr.

Using trichlorethylene as a vapor agent, this new Currier Model 32-E is equipped with a patented pneumatic solvent spray system that is leak-proof. The heating method is electrical, using 5.25 kw. and the entire interior has a corrosion-resisting zinc base coating. Working dimensions are 28 x 24 in., with 24-in. vapor depth. *Currier Co.*

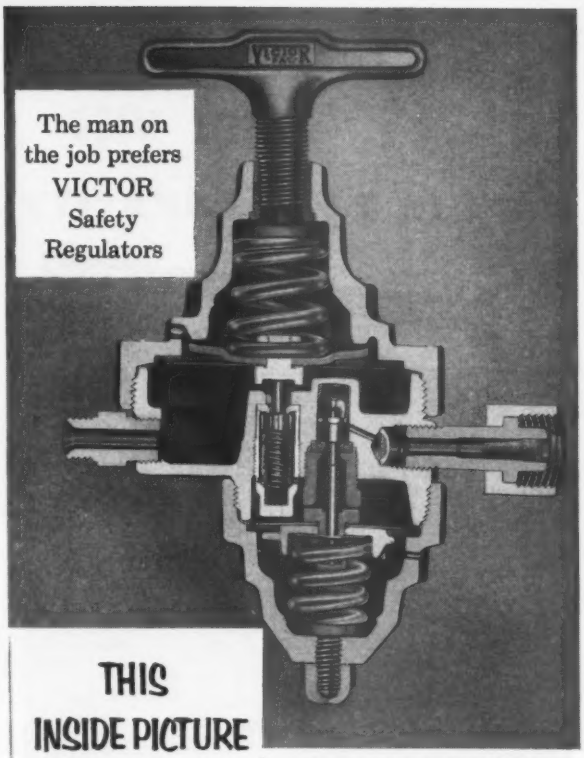
. . . for more details, circle No. 198 on postcard

I-BEAM TROLLEYS
. . . with crowned and flame-hardened treads



Two lines, one a push type and the other hand-geared, of I-beam trolleys designated the Budget Hi-Cap models, feature forged alloy steel wheels with treads that are crowned for easy rolling and flame hardened to keep tread wear at a minimum. Crowning also allows the trolleys to operate equally well on all I-beam flange tapers from 0 through 15 deg. Both types feature life-lubricated bearings and are said to need maintenance or repairs rarely. Other design features are shielded ball bearings at each wheel and rolled steel side plates with safety-lug end bumpers. Simple rearrangement of spacer washers on the trolley cross shaft permits adaptation to a wide range of I-beam sizes. *Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.*

. . . for more details, circle No. 199 on postcard



Cut-away of Model VTS400 series 2-stage Safety Regulator. Victor makes regulators for almost every gas and use, for pressures to 10,000 p.s.i., and volumes to 28,000 c.f.h.

YOU GET GREATER SAFETY. All Victor regulators have the "stem type" seat mechanism that closes with the impact of inlet pressure, and is protected from seat ignition because the incoming gas loses its heat of compression by expanding into the inlet pressure chamber before passing over the seat and through the nozzle. Dense die forged bodies and spring housing caps provide maximum strength and durability. High inlet pressure type regulators have a reliable, self-reseating relief valve that insures complete protection. Diaphragms are protected from excessive and damaging movements by "stops" and rubber cushions. A porous sintered bronze inlet filter keeps out injurious dirt and foreign material.

SINGLE AND TWO-STAGE TYPES. Victor offers single-stage regulators to meet most capacity or delivery pressure requirements; and two-stage regulators for operations which require a constant delivery pressure over a range of varying inlet pressures.

Many nationally known companies, small and large, and in all types of industry have standardized on Victor Safety Regulators because of their trouble-free operational characteristics and reliable service.

Call your Victor dealer NOW.

VICTOR EQUIPMENT COMPANY

VICTOR for welding

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

32

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3821 Santa Fe Avenue Los Angeles 58

. . . for more details, circle No. 93 on Reader Service Postcard

NEW TOLEDO No. 22 PIPE VISE

1/8" to 2 1/2" CAPACITY

TOLEDO QUALITY

COMPETITIVELY PRICED

Something new in quality, low cost pipe vises. Look at these TOLEDO *Quality Checked* features

- Strong, sturdy frame—but the No. 22 weighs only 12 lbs.
- Large diameter Acme vise screw threads for longer service—and they bear directly on upper jaw
- Yoke mounts quickly for right or left hand use
- Hardened steel, interchangeable jaws designed for most effective grip regardless of pipe or conduit size—⅛ to 2½"
- Large bolting area—contact points evenly distributed for secure attachment of vise
- Also available soon in ⅛ to 4½" capacity

Send for new catalog. Watch for TOLEDO'S new vise stand with integral yoke or chain vise.

Quality Checked

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO®

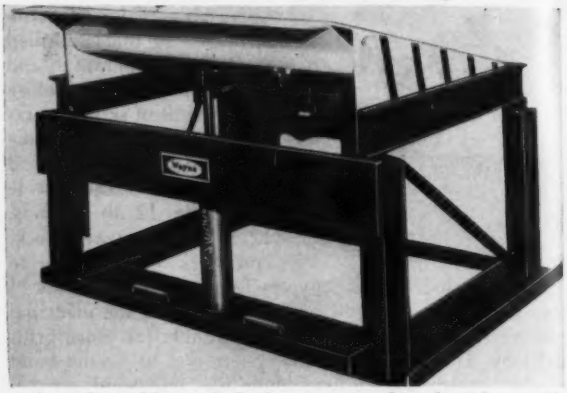
PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

THE TOLEDO PIPE THREADING MACHINE CO., TOLEDO 4, OHIO

. . . for more details, circle No. 94 on Reader Service Postcard

POWERED DOCK RAMP

. . . portable, needs no special wiring

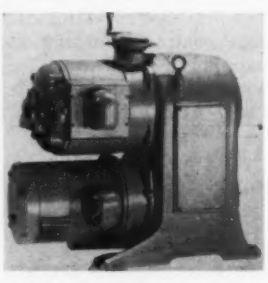


An adjustable steel dock ramp combined with a self-contained power activating mechanism forms an economical unit that requires no installations or special wiring except accessibility of 110-v. outlet. Needing no pit construction or permanent connections, it can be used anywhere with simple dock height adjustment. Its main unit, or platform, construction is that of the Dock-O-Matic, available in 10,000- or 20,000-lb. capacities in several sizes. The power unit is a self-contained motor pump and mechanism on the underside of the platform, while the power cylinder is a single-action piston type hydraulic assembly with a filtering device. *The Wayne Pump Co.*

. . . for more details, circle No. 200 on postcard

POWER UNIT

. . . converts a-c. motors to variable speeds

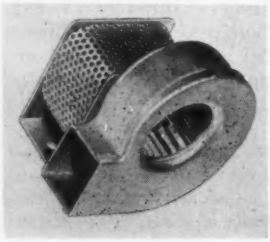


By connecting induction motor leads of any standard NEMA 3-phase a-c. motor to this Varidyne power unit, the motor will get a variable frequency current generated by the unit, with speeds changed at the power unit by a handwheel, or remotely by mechanical or electrical controls. Suited for use where space or weight limitations, environmental hazards or other causes rule out other variable speed drives, it is easy to understand, install and maintain. Models are available for loads of from 1 to 50 hp., with speed variations of up to 5.1, and come in designs permitting soft starts, inching, and jogging of the drive motor. Automatic speed change is possible by addition of Varitrol pneumatic control, operating in response to pressure, temperature, position, humidity, and other variables. *U. S. Electrical Motors, Inc.*

. . . for more details, circle No. 321 on postcard

SMALL BLOWER

. . . cools transmitters, small areas, etc.

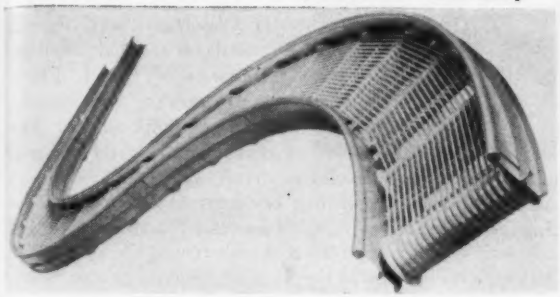


Designed for use with photography equipment, radar, transmitters, amplifiers, printing presses and general applications for moving air and cooling small areas are three models of Bohn blowers—two single types and a double unit. Dimensions are 3½

in. wide, 2⅞ in. deep and 3¾ in. high, with weight of the single, 22 oz., and the double, 26 oz. Units draw 10 watts, 115 v. a-c; operating speed is 3,000 rpm. (free air), and air displacement is 17 cfm. *Minarik Electric Co.*

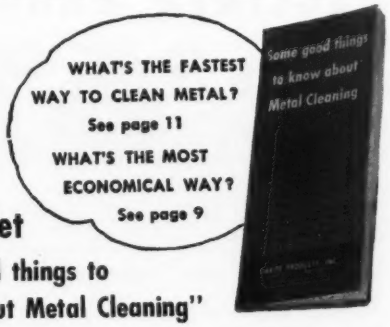
. . . for more details, circle No. 322 on postcard

POWER-DRIVEN CONVEYOR
. . . carries around curves, reverses instantly



Bags, cartons, bundles or packages can be conveyed around turns of any length under power in this spring-steel belt Power-Curve model. Available in standard widths of 18, 24, and 32 in., with one belt roller for each 10 deg., the conveyor runs either way, reverses instantly. Only seven in. of headroom is required, with no take-ups or return idlers and no special head or tail pulleys. Compound curves can be supplied also; straight conveyors of the same specifications are available in any length and can be built with curved sections, and vertical conveying can also be arranged with a variation of the standard units, as well as any angle up or down. *Power-Curve Conveyor Co.*

. . . for more details, circle No. 323 on postcard


WHAT'S THE FASTEST WAY TO CLEAN METAL?
See page 11
WHAT'S THE MOST ECONOMICAL WAY?
See page 9
Some good things to know about Metal Cleaning

Oakite's FREE Booklet

"Some good things to know about Metal Cleaning"

answers many questions that mean better production, more profit for you. Just look at the table of contents:

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- Zinc phosphate coatings
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- Treating water in paint spray booths
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FREE For this 44-page illustrated booklet, write Oakite Products, Inc., 1001 E. First St., Los Angeles, or 681 Market St., San Francisco, Calif.

SPECIALIZED INDUSTRIAL CLEANING
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MATERIALS • METHODS • SERVICE

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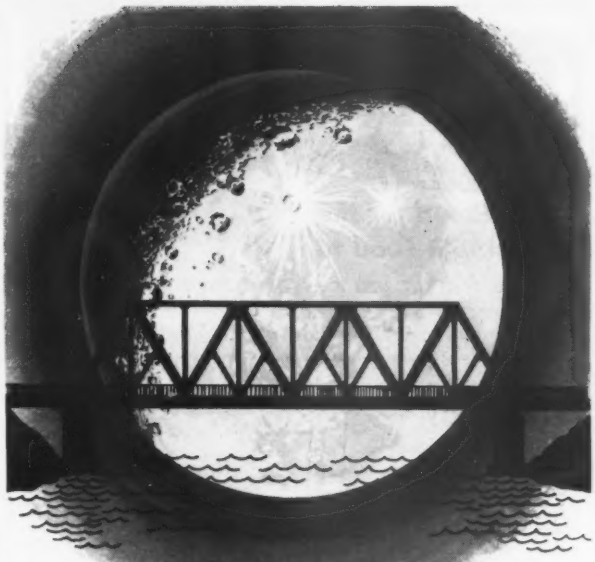


THE BRIDGE THAT MOONPOWER MOVED

Dalzell Rigging "imagineers" the way

When Dalzell Rigging had a bridge to lift — one too heavy for the strongest jacks and cranes — even experienced engineers were stumped.

Then Dalzell "imagineered." They harnessed the age-old power of flooding lunar tides, let massive barges float it high and clear.

Here is "imagineering" at its most productive. Imagination combined with practical rigging experience dating from 1923. Dalzell Rigging "imagineers" with ability, speed, safety and economy.

It took "imagineering" to recognize the power potential in darkly swirling tidal waters — and Dalzell Rigging, in the bold and effective tradition of the experienced rigging engineer, will see the imaginative, logical solution to your toughest rigging problem.

Whether it be skilled manpower or faraway "moonpower," call on Dalzell Rigging for your very next job. Chances are you'll repeat if you do; over 70% of Dalzell's growing business is from satisfied callbacks.

Write for Dalzell's "Imagineering" brochure.

DALZELL RIGGING CO.
HAULING • TRUCK CRANES • HEAVY LIFTING
1505 62nd St. • OLympic 5-2913
Emeryville • California

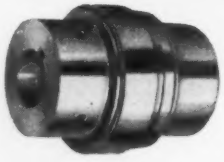
. . . for more details, circle No. 96 on Reader Service Postcard

LOVEJOY Power Transmission Equipment

Job-Rated for the Particular Load to Give Maximum Performance on Your Job

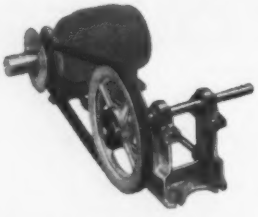
Easily Installed • Economical • Maintenance-Free

FLEXIBLE COUPLINGS:



No lubrication required. Provide positive protection against vibration, torque, shock of intermittent loads. Cushions changed without shutdown. Light, medium and heavy duty from fractional hp. to over 3000 hp. Request Coupling Catalog.

VARIABLE SPEED PULLEYS:



Quickly installed on new or old equipment. Change speed while machine is running. Ratios to 8 to 1. Fractional to 15 hp. Request Power Transmission Equipment Catalog.

SELECT-O-SPEED TRANSMISSIONS:

Economical as compared to other variable speed transmissions. Instant adjustment over wide range of speeds. Hand wheel or lever control. Ratios to 10 to 1. Fractional to 7½ hp. Request Power Transmission Equipment Catalog.

UNIVERSAL JOINTS:

Precision ground. Finest alloy steel. No binding, backlash or end play. 13 sizes, ½ to 207 hp. Diameters ½ to 4 in. Bores ¼ to 2 in. Lengths 2 to 10⅝ in. Request Universal Joint Bulletin.

You can get Lovejoy performance for your application. Let us know your requirements or request complete-line catalog.

FACTORY REPRESENTATIVES:

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Capitol 3-5345

Seattle, Wash.:
CHAIN GEAR, INC.
822 First Ave., S.
MAin 7000

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Amherst 5-2914

LOVEJOY FLEXIBLE COUPLING CO.

4892 W. Lake St., Chicago 44, Illinois

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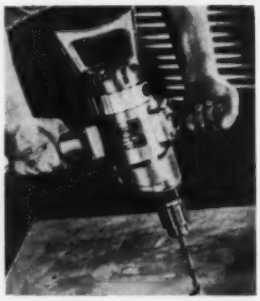
PORTABLE ELECTRIC DRILLS
. . . with up to 130% more power



Claimed by the manufacturers to make obsolete all other drills of like capacity are three new models—½-in. Heavy-Duty, ⅝-in. Heavy-Duty and ¾-in. Standard — that deliver 100%, 75% and 130% more power, respectively, than previous models. The drills feature three-position built-in reversing mechanism drives with equal power in both directions, and positive key-drive chuck to eliminate slippage in either forward or reverse. Starting torque of each unit is high, with 90 ft. lb. delivered in the ½ in., 130 in the ⅝ in., 160 in the ¾ in. A centrifugal fan ventilating system keeps a cool operating temperature even on tough jobs. Considered by the makers to be basic power units rather than drills alone, the tools are readily adaptable for powering speed reducers, chain and winch hoists and light elevators, or for driving cylinder hones. Cost of two of the drills is less than previous models, while the ¾-in. model is about the same. Weight in all cases is lighter. *The Black & Decker Mfg. Co.*

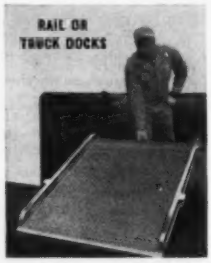
. . . for more details, circle No. 324 on postcard

DO YOU KNOW?

YOU CAN BUY A GENUINE MAGLINER MAGNESIUM DOCK BOARD for as little as $67.50

IT'S A FACT—a standard Magliner magnesium dock board costs so little when you consider its many advantages . . . *one man handling, greater safety, faster loading, and lower costs*—that it will pay you big dividends to try one on your dock.

Magliner magnesium dock boards are now available in 48 standard sizes. They're light, strong, tough—*only a third the weight of steel equipment!* Patented, adjustable drop-lock anchors boards securely for varying truck height differences and dock-to-carrier spans. TRY A MAGLINER dock board. Immediate shipment from factory stock.



MagLiner MAGNESIUM DOCK BOARDS

Write for Bulletin DB-203.

MAGLINE INC., P. O. BOX 56, PINCONNING, MICH.

Canadian Factory: Magline of Canada, Ltd., Renfrew, Ontario

Air Mac, Inc., 3838 4th Ave., South, Seattle 4, Wash.; 313 N. Grandview, Yakima, Wash.; East 3710 Trent Ave., P. O. Box 1125, Spokane 10, Wash.; 1111 S. E. Grand, Portland 14, Ore.; 1003 Washington Blvd., Tacoma 2, Wash.; **All Bearing Sales & Service Co.**, 602 Fulton St., Fresno, Calif.; **W. T. Billiard, Inc.**, 734 E. Third St., Los Angeles 13, Calif.; **Equipment Supply Co.**, 16 Post Office Pl., Salt Lake City 1, Utah; **E. D. Flournoy Co.**, 217 6th St., S.W. Albuquerque, N.M.; **Hamerslag Equipment, Inc.**, 110 Freeway Blvd., South San Francisco, Calif.; **Kistler Industrial Service**, 902 So. Central Ave., P. O. Box 1204, Phoenix, Ariz.; **Plant Equipment Co.**, 1400 Market, Denver 2, Colo.; **Winn Supply Co.**, 256 7th Ave., P. O. Box 1709, San Diego 12, Calif.; **Yale & Towne Mfg. Co.**, 6027 Whittier Blvd., Los Angeles 22, Calif.

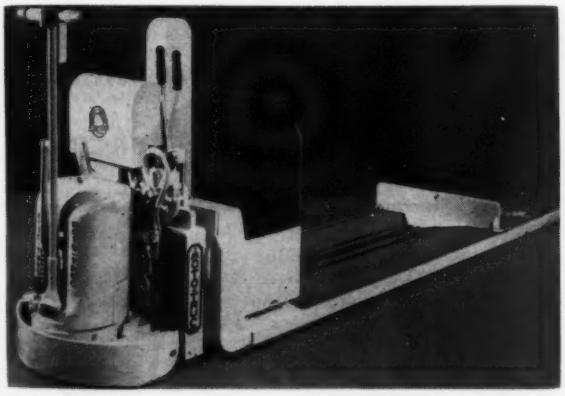
. . . for more details, circle No. 98 on Reader Service Postcard

INDUSTRIAL POWER SWEEPER
. . . operates full day on one tank of gas

This Wilshire Model 1500 with a Wisconsin air-cooled 15-hp. engine features a Dustomatic dust system with a high volume fan which deposits all dust into a heavy duty bag that need not be removed from the machine for cleaning. A multiple disc reversing clutch, three-speed transmission and drive axle mounted differential, and a heavy chain drive from transmission to differential make up the power train. Finger tip dual switches on the steering column actuate both the hopper's hydraulic dump and the seven-in. lift of the sweeping chamber, enabling the machine to sweep bulky debris. *Wilshire Power Sweeper Co.*

. . . for more details, circle No. 325 on postcard

WALKIE PLATFORM TRUCK
. . . has pusher bar for self-unloading



No pallet or other load supporting device is needed with this truck since the load rides on the truck's platform. Loads are preassembled on dunnage, the truck is driven beneath and platform is raised under the load for pick-up. After positioning in the freight car or trailer, the load is pushed off the platform to the floor by a hydraulically actuated pusher bar controlled by levers near the operator. Especially designed for long, flat loads such as steel sheet, plywood, building materials etc., it uses two load wheel assemblies to deal with heavy loads and small underclearance. Standard truck dimensions are 135 x 39 in.; lowered height of platform is 2⅝ in., with forward end tapered to 1 in.; lift of platform is 4¾ in., and length is 96 in. Weight, less battery, is about 1,400 lb. *Moto-Truc Co.*

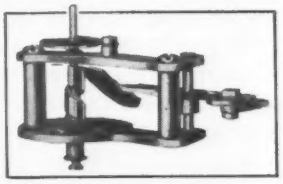
. . . for more details, circle No. 326 on postcard

Call PACIFIC SCIENTIFIC

Helicoid Gages

FOR PRESSURE, VACUUM OR COMPOUND SERVICE!

LONG LIFE ACCURACY... no gears or teeth to wear in this exclusive Helicoid design!



This simple cam and roller design is the heart of Helicoid's long-life accuracy. There are no gears or teeth to wear... no constant servicing or maintenance. The smooth-acting Helicoid movement is positive and precise, yet in actual service it is proved to outlast and outperform gear-type gages.

HELICOID BOURDON TUBES are designed to give maximum torque with minimum stress. They provide greater endurance... withstand millions of pulsations without stretching, leaking or cracking.

Send for complete information on Helicoid... gages that cost less per gage, per year. Write today!

TRADE MARK Pacific

Representing:
- Automatic Temperature Control Co.
- Cal-Tester
- Coates Electric Co.
- Lewis Engineering Co.
- Link Engineering Co.
- Claud S. Gordon Co.
- The MB Manufacturing Co.
- Missimers Incorporated
- Partlow Corporation
- Soiltest Incorporated
- Tinius Olsen Testing Machine Co.
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PACIFIC SCIENTIFIC CO.

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INDUSTRIAL TESTING EQUIPMENT AND INSTRUMENTS SINCE 1919

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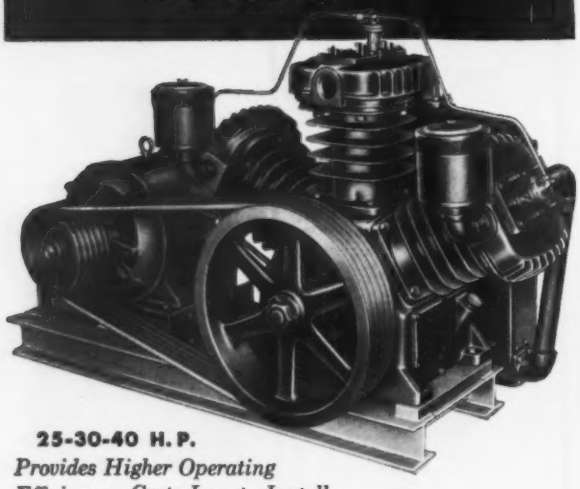
CURTIS MODEL C-100

Two-Stage, Air-Cooled Air Compressor

Delivers *MORE* Air...

PER MINUTE HORSEPOWER KILOWATT HOUR OF ELECTRICAL ENERGY CONSUMED



25-30-40 H.P.
Provides Higher Operating Efficiency Costs Less to Install

The Curtis Two-Stage Compressor assures a saving in your power costs. It's air cooled, thereby eliminating expensive water bills—quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

For complete information write for illustrated folder.

YOU CAN COUNT ON REMEMBER...

Curtis

OUR 103rd YEAR
MANUFACTURING COMPANY
PNEUMATIC DIVISION
1954 Kienlen Ave. St. Louis 20, Mo.

AIR HOISTS
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CM-21

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Ed Craven, 1018 Southeast Eighth Ave., Portland 14, Oregon

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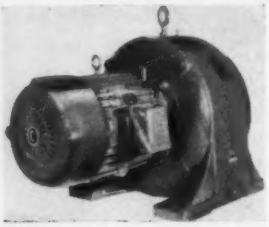
NEW GEARMOTOR LINE
...with polyphase, single phase and d-c motors



Completely redesigned to give increased dependability, cooler operation, maximum wear life and trouble-free service, this line of gearmotors reportedly assures customers of top efficiency in all slow-speed power applications. Designed to meet users' specific needs, they are available in three motor types, with a variety of mounting shafts possible, including downshaft and tilted shaft. They can be obtained in open drip proof, dust proof, explosion proof and totally enclosed frames. The unit pictured here is available with single, double and triple reduction and output speeds from 750 to 7.5 rpm. *Century Electric Co.*

... for more details, circle No. 327 on postcard

WELDER/POWER PLANT
. . . with 225-amp. current or 5-kw. a-c. power

When used for welding this model AEA-200 L produces a full 225 amp. of continuous rated, high cycle current, while for operation of power tools, lights, etc., it gives 5 kw. of 110-220 a-c. power, with 1 kw. of 110 v. d-c power available while welding. New design features of the versatile, portable unit are a shielded

READ

any surface temperature with *Alnor*® PYROCON

Equipment...material...metallic or non-metallic...flat, curved... revolving or stationary—you can read every surface temperature accurately in less than 3 seconds!

Compact in size, complete in precision design and workmanship, this rugged instrument assures the highest standards of speed, accuracy and dependability. Heavy-duty, shock-resisting movement is housed in a balanced unit that is easy to handle... reaches any point.

Alnor Portable Pyrocons come in scale ranges to 2000° F., with thermocouples for every application. You'll find full details on the Pyrocon exactly suited to your operations in Bulletin 4257. Send for your copy now. Write: Pacific Combustion Engineering Co., 4832 Huntington Drive, Los Angeles 32, Calif.; Matheson-Doherty Company, 225 Shaw Rd., So., San Francisco, Calif.; Fairman B. Lee Company, 219 Central Bldg., Seattle 4, Washington.

...for more details, circle No. 101 on Reader Service Postcard

muffler and larger gas tank for greater power output. This model, as well as its twin, AEA-200, without the power feature, may be equipped with handy Redi-Pull starter, rubber-tired hand-running gear or road towing trailer. *Miller Electric Mfg. Co., Inc.*

. . . for more details, circle No. 328 on postcard

JIFFY-MIXER
. . . time saver for metal wood protective coatings

Developed by a San Francisco inventor, this rugged, easy-to-use paint mixer is rotated by any electric or pneumatic portable power tool. Used in many commercial fields, its manufacturer also recommends it for products such as aluminum and lead base paints, latex, powders, and even sheet rock mud. In mixing Apexior No. 1 protective coating used in tanks, boilers, steam vessels and piping, it shows an 80% time saving. It gives more thorough, smoother mixes in shorter time, can be used in open containers with no splashing or cutting into container walls, and is designed not to be clamped to the container but moved about by the operator of the power tool, who can thoroughly free container sides and bottom from solids. *Jiffy Mixer Co., Inc.*

. . . for more details, circle No. 329 on postcard

A GUARANTEED HEAT SOURCE, *Easily Installed*

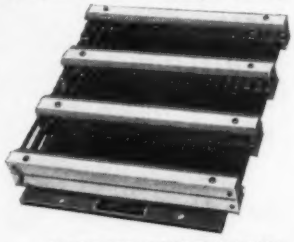
"FOLDED-and-FORMED" Heating Elements

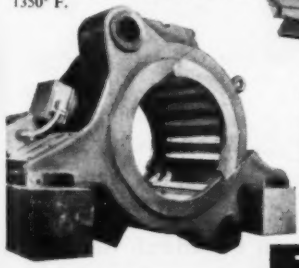
are quickly, easily installed in furnaces, ovens, kettles, etc., to assure a heat source unequalled for quick rise to temperature; long-life efficiency; low-cost maintenance and repairs.

STANDARD RACKS

Temperatures from 750° to 1700° F.

Sizes 12" x 12". Installed vertically or horizontally, side-by-side, end-to-end, or in banks, to meet K. W. requirements. Five-year guarantee, at temperatures to 750° F. or 1350° F.





CUSTOM BUILT RACKS

Available in wide range of sizes and combinations, to fit any flat or curved area, to provide maximum K. W. at temperatures to 1850° F. Hundreds of different applications are demonstrating the outstanding efficiency and economy of "F-and-F" Heating Elements. You, too, can use them *profitably!*

View of Extrusion Press Container Housing—container removed—temperature 1200° F. Heaters keep container and die at aluminum extrusion temperatures.

TREN INC.

Electrically Heated Industrial Equipment

242 LEVERINGTON AVE., PHILA. 27, PA.

In Canada Supreme Power Supplies Limited Toronto 14

. . . for more details, circle No. 102 on Reader Service Postcard

Dayton & Bakewell

SINCE 1926

PRODUCTION EQUIPMENT SPECIALISTS

TO SOUTHERN CALIFORNIA INDUSTRY

● EXPERIENCE The *right* equipment for the job can make the difference between average and top efficiency . . . and a BIG difference in costs. D&B's long EXPERIENCE . . . more than 30 years of specialized service in recommending and supplying high quality production equipment . . . has helped hundreds of plants and shops in Southern California to profit from peak production performance at lowest costs.

Try us the next time you have a production problem involving machine tools or sheet metal machinery. Solving tough ones is our specialty. D&B's all-important EXPERIENCE is yours for the asking, at no extra cost, just call . . .

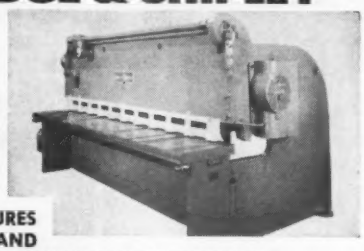
TRinity 7466

Dayton & Bakewell

SINCE 1926

● LODGE & SHIPLEY

Air Clutch POWER SHEARS



THESE FEATURES WILL SPEED AND SIMPLIFY YOUR SHEARING OPERATIONS

● Special Lodge & Shipley self-adjusting Air Clutch eliminates most maintenance—protects shear with safety feature.

● Pneumatic Ram Counterbalances prevent "floating"—offset shearing thrust. Ram inclined for Slant Blade cutting.

● Hydraulic Holddowns allow individual removal of fingers.

● Front Operated Back Gauge, calibrated in 1/64ths — easily set to 1/128ths of an inch.

● Blade Clearance Indicators read in thousandths, assure burr-free cutting and longer blade life.

WIDE RANGE OF CAPACITIES AVAILABLE

To see one of these high-performance shears in operation, or to request bulletins and prices, phone . . .

TRinity 7466

DEPT. I-67, 1939 SANTA FE AVENUE

LOS ANGELES 21, CALIF.

Dayton & Bakewell

SINCE 1926

. . . for more details, circle No. 103 on Reader Service Postcard

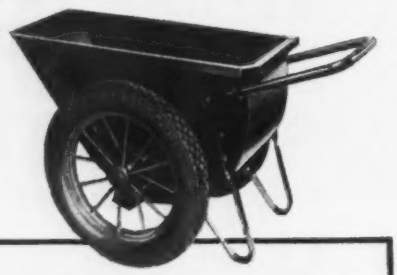
EQUIPMENT GAR-BRO ENGINEERING SERVICE

Push Carts

balance the load

For faster, easier handling

MORE LOAD
LESS EFFORT
MANY USES



"Muscle-matched" Gar-Bro push carts haul 30% more load with half the effort because they are balanced—and lighter at the handle—when fully loaded. Weigh nearly a third less than ordinary carts, with no sacrifice of strength.

Designed to handle castings, sand, ashes, chemicals, rubbish and many other bulk materials.

Two widths: 30" with 6 cu. ft. capacity; 35" with 8 cu. ft. capacity. Wheels have steel spokes, depressed hubs, 4" roller bearings. Heavyduty 4.00 x 18" 4-ply pneumatic tires. Rocker dump type carts and rocker attachments also available.

Write for catalog and further information.

Gar-Bro Manufacturing Co.
2415 E. WASHINGTON BLVD. • LOS ANGELES 21, CALIF.

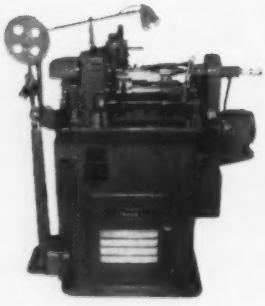
...for more details, circle No. 104 on Reader Service Postcard

PRECISION • SPEED • PRICE

TRAUB

Automatic SCREW MACHINES

The only low cost automatics engineered to produce High Precision, High Quality parts.



Immediate Delivery

A-15	A-25	A-42
19/32" Collet Cap.	1" Collet Cap.	1 5/8" Collet Cap.
$2595	$2730	$4660

Cams, Set-up & Service by factory-trained technicians. Parts, Tooling Accessories in stock at all times.

Exclusive Distributor West of the Mississippi

ALEXANDER MACHINERY CO., INC.

2025 So. Grand Ave., L. A. 7, Calif. RI 7-7421

...for more details, circle No. 105 on Reader Service Postcard

ALL-PURPOSE FLOOR MACHINE
. . . for hazardous industries

Developed for use in powder factories, atomic research plants, oil refineries and other hazardous industries, this all purpose floor machine is constructed, safety-tested and sealed to prevent sparks and static that might ignite explosive gas, dust, fumes or vapors. Its electric switch is on the motor housing, but start-and-stop control is retained on the handle. The precision-built gear unit is grease-sealed and the dual handles spread the load, eliminate torque effects and give better operator-control. Made with 16 and 20-in. brushes, the machine has instant-change attachments for handling many jobs besides polishing. *Holt Manufacturing Co.*

. . . for more details, circle No. 330 on postcard

SELECTIVE SOLVENTS
. . . nonflammable, remove oil and grease

Adaptable to vapor degreasing or cleaning by liquid immersion, Dupont Freon solvents will bite into and remove oil, grease and dirt without harming delicate metal parts or electrical insulation, yet are safe enough to use in ordinary work areas with conventional ventilating equipment. Three types are available in container sizes

CHOOSE THE HELMET MOST PREFERRED BY WESTERN WELDERS

HUNTSMAN

GET FULL HEAD PROTECTION 100% of the time

New Combination Hard-Cap Welding Helmet

NOW with new ROTO-CLIP

permits you to detach or attach helmet without removing Hard-Cap from your head. ORDER TODAY!

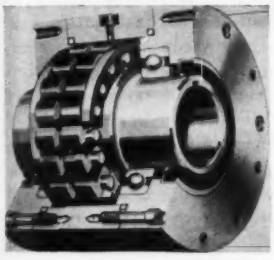
KEDMAN CO., 233 South 5th West
Salt Lake City 1, Utah

...for more details, circle No. 106 on Reader Service Postcard

from 10 to 55 gal. Primary advantage of the Freon solvents rests in their safety. Most important use proved to date is in cleaning of new and reconditioned electrical motors, because they do not soften, craze or dissolve any of the common wiring insulation materials. Other uses include cleaning of photographic and sound recording films and tapes, oxygen breathing apparatus, typewriter rollers. A potential use is as an additive to other, more dangerous, solvents to decrease the latter's flammability or change their solvency or boiling point properties for special applications. The three types available are MF, with 75 deg. F. boiling point; BF, which boils at 199 deg. F., and TF, whose boiling point is 118 deg. F. *E. I. du Pont de Nemours & Co.* **. . . for more details, circle No. 331 on postcard**

SEALED SPRAG CLUTCHES

. . . for indexing, backstopping & over-running



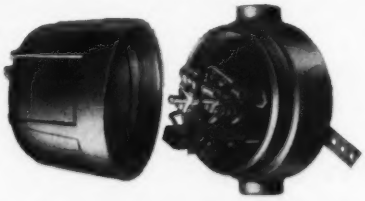
The new series of double ball-bearing clutches intended primarily for indexing applications in which retention of light oil is essential for long life and accuracy, also are efficient when abrasives are present since the seals keep out contaminating particles. Series B, for true over-running and for low speed service where the inner race overruns, comes in bore diameters from 2½ to 5½ in., with torque capacities from 1,875 to 11,600 ft.lb. Series C, for indexing and backstopping, is available with 2¾ to 5½-in. bore diameters and with torque from 3,160 to 11,600 ft. lb. *Formsprag Co.*

. . . for more details, circle No. 332 on postcard

LEVER ARM CONTROLS

Explosion-Proof Weather-Proof Dust-Proof

(Suitable for Class 1 Group D; Class 2 Group E, F, G; NEMA, 1A, 2, 3, 4, 7, 9, 9A)



A small compact, explosion-proof case which contains Mercoid hermetically sealed mercury contacts mounted on an adjustable carrier attached to a movable shaft. Movement of shaft causes mercury switches to open/close electrical circuits.

Standard types—SP-ST, SP-DT: Available with as many as five 4 amp. switches; three 10 amp. switches or three 25 amp. switches.

Write for Bulletin No. 33

THE MERCOID CORPORATION
4209 Belmont Ave., Chicago 41, Ill.

. . . for more details, circle No. 107 on Reader Service Postcard

Specially developed by the Reliance Division of Eaton Manufacturing Company, the new packaging for all Eaton-Reliance industrial fasteners "has everything"—attractive appearance . . . bold specification markings on both inside and outside packages . . . quick product identification with "see through" windows of rugged DuPont Mylar® which will not puncture, tear or yellow with age . . . the "tens" system for quick, easy inventory taking and counting out. Production people are enthused with the savings and conveniences possible with this packaging—quick, efficient stocking, ordering, inventorying and requisitioning, and using without waste.

Send for descriptive literature, or contact our West Coast Distributors:

Hobelmann & Co., 225 Kansas St., San Francisco
Grether & Grether, Stockton and Whittier, Calif.

We'll be at Booth 903

TRIPLE INDUSTRIAL SUPPLY CONVENTION

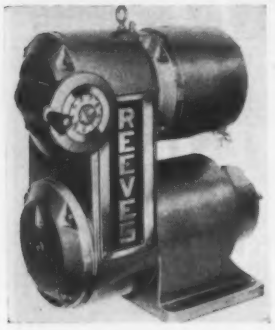
Civic Auditorium, San Francisco

EATON RELIANCE DIVISION MANUFACTURING COMPANY
916 CHARLES AVENUE • MASSILLON, OHIO

SALES OFFICES: NEW YORK • CLEVELAND • DETROIT
CHICAGO • ST. LOUIS • SAN FRANCISCO • LOS ANGELES

. . . for more details, circle No. 108 on Reader Service Postcard

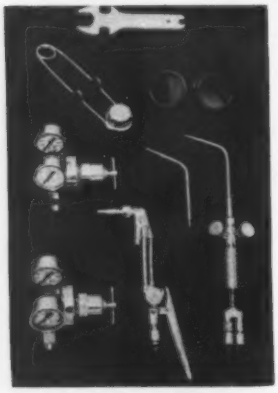
VARI-SPEED MOTODRIVES
. . . automation units with ratings up to 5 hp.



Available soon in standard assemblies tailored to fit a wide range of space requirements is a series of Reeves Vari-speed Motodrives with improved operating efficiency and extended ratios of speed variation. Plus standard sizes, many motor and mounting modifications, as well as remote control features of the series, are available for unusual installation requirements. The units, available in integral ratings up to 5 hp., follow the general pattern of the Reeves fractional horsepower Motodrive, size 100. An automation tool for any industry the Motodrive is especially useful combined with automatic control systems and accessories such as magnetic brakes and tachometers. *Reliance Electric and Engineering Co.*

. . . for more details, circle No. 333 on postcard

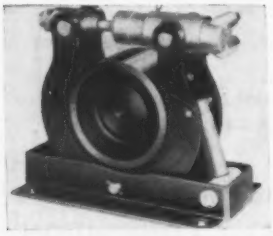
WELDING, CUTTING OUTFIT
. . . weight: 19 oz.—length: 12½ in.



Designed for performance in the light-to-medium range, this outfit consists of two style 8,000 single-stage regulators, twin 3/16-in. gas hoses with connections; welding torch with mixer and two tips; cutting attachment with one tip; wrench, sparklighter and goggles. Suited for small industrial plants, sheet metal shops and applications where intermittent service calls for low cost equipment, it will handle many welding, brazing, heating and cutting operations. It will weld metals up to 3/16 in. thick, or 5/16 in. if larger tips are used, and can cut steel plate up to 1-in. thick. *Air-Reduction Pacific Co.*

. . . for more details, circle No. 334 on postcard

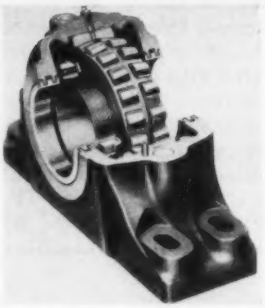
HYDRAULIC BRAKE
. . . 6 x 3 in., for small cranes and machines



Smooth powerful service braking and accurate load spotting control on light industrial cranes is provided by this new brake, smallest in the Wagner line. Suited to many other applications, such as tension control on mill roll stands and emergency stopping, holding and braking on many machines and devices, the standard unit is designed for use with hydraulic brake fluid only; if specified, it can be furnished with mineral oil compatible parts for special fluid power holding operations, and it is also available as a combination service and parking brake to give automatic emergency braking in power failure. *Wagner Electric Co.*

. . . for more details, circle No. 335 on postcard

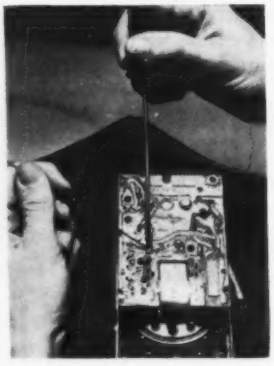
SPHERICAL PILLOW BLOCKS
. . . with unique mounting features



Spher-Align is the trade name for a new line of spherical pillow blocks with the Micro-Mount feature that makes it possible to seat bearings solidly on shafts quickly and easily. The method employs set screws parallel to the bore in the adapter nut, and after the bearing is snugged up with the nut, adjustment is completed by turning the screws against the locking washer until bearing, adapter and shaft form an integral unit. Recommended for applications in which self-alignment, ease of installation and maintenance are desirable, the pillow block has a rugged housing of close grained semi-steel. The bearing design allows lubricant to enter at the center and move outwardly along all bearing surfaces. The blocks come in standardized dimensions for interchangeability, come in both expansion and non-expansion types, are sized to fit shafts from 2 7/16 to 8 in. diameters. *Dodge Manufacturing Corp.*

. . . for more details, circle No. 336 on postcard

TINY SOLDERING IRON
. . . for miniaturized and printed circuitry



Weighing less than 1½ oz., this iron is designed for production line soldering of sub-miniature equipment, printed circuits and instruments. Very small connections can be soldered inside equipment with minimal heat loss or damage to adjacent wiring, insulation, and terminals, according to GE company engineers. A tiny tubular heater in the iron's extreme tip develops a tip temperature of 750 to 850 F, and the entire assembly can be changed in less than 30 sec. Rated 6 v., 12 watts, the iron comes with 6-volt transformer integral with a 6-ft. cordset, or with cordset and terminals less transformer. The tip of vacuum-processed iron is of 5/32-in. diameter. *General Electric Co.*

. . . for more details, circle No. 337 on postcard

¼-IN. DRIVE HANDLE
. . . lets you spin nuts and bolts in and out

A special button on top of the Spring-Master drive handle, that floats independently of the handle, allows you to simply "spin" out or in the nuts or bolts, and also acts as a palm saver. Claimed by the manufacturer to be the fastest man-powered drive handle made — even faster than a ratchet—it is powered by a crossbar which acts both as a fly wheel and as a leverage point to loosen or tighten nuts or bolts. *Hunter Tools.*

. . . for more details, circle No. 338 on postcard

THE INDUSTRIAL WEST ON ITS WAY

plants • production • distribution • personnel

GUIDELINES

JUNE 1957

- **A NEW INDUSTRY FOR THE WEST** was heralded last month with the dedication of General Electric's new atomic power equipment department laboratory at Vallecitos, Calif. (near San Jose). The laboratory will help develop atomic equipment for industry. The new $10,000,000 facility consists of a radioactive materials laboratory, an experimental physics laboratory, a materials testing reactor, and a developmental boiling water power reactor. **The boiling water reactor will be completed this year and will furnish steam for generation of this country's first privately financed atomic electric power.** This steam will be supplied to a 5,000-kilowatt turbine generator installation constructed and operated at the site by the Pacific Gas and Electric Co. Electricity produced by the plant will be fed into the PG&E transmission system.

- **WAREHOUSES SPRING UP OVER THE WESTERN LANDSCAPE!** Many of these are reported on the following pages. **You don't build warehouses unless you are manufacturing and selling.** And the number of warehouses popping up in the West is a sure sign of business activity!

- **BIG COMPANIES BUYING UP WESTERN LAND** . . . Last month we reported that the Union Pacific Railroad purchased a 93-acre industrial tract in Portland. Now, North American Aviation has acquired options to purchase 12,600 acres near Reno . . . Ryan Aeronautical Co. has bought a 27-acre industrial site near Torrance, Calif. . . . and Bethlehem Pacific has purchased an 18-acre site near Seattle. **Watch for developments.**

- **THE WEST IS A "MERGING PLACE?"** Who said the East has a monopoly on mergers? Seattle's Weyerhaeuser Timber Co. has merged Kieckhefer Container Co. and the Eddy Paper Corp., and Demo-Haines (an Oklahoma outfit) has consolidated its manufacturing activities with Darco, at El Segundo, Calif.

- **MORE COMPANIES MOVE WEST.** Ozalid plans $1,000,000 manufacturing plant . . . Weldaloy announces that it is "the first of the nation's copper alloying firms to take a Western step" . . . Japanese firm plans $55,500,000 Alaska pulp mill . . . Wilson Sporting Goods Co. of Chicago is building a warehouse near Los Angeles . . . **other firms get set for Western expansion.**

— Details on following pages —

THE INDUSTRIAL WEST ON ITS WAY
is a special monthly feature of . . .

Western Industry

. . . serving plant operating executives in the nation's fastest growing region.
609 Mission St., San Francisco 5, Calif.

S & S Machinery opens Western division

LOS ANGELES—S & S Machinery Co. of Brooklyn, N. Y., announces the opening of its new Western division at 6945 Bandini Blvd. This latest S & S branch, with approximately 15,000 sq. ft. of floor space, is a complete operating unit, containing a showroom, service shop and parts department. Manager of the new branch is *Charles Schaeffer*.

Ozalid plans $1,000,000 Western manufacturing plant

LA HABRA, CALIF.—A new $1,000,000 manufacturing plant will be built by the Ozalid division of General Aniline & Film Corp. on an 11-acre site at La Habra, off the Imperial Highway, on the outskirts of Los Angeles.

The new plant, to manufacture sensitized materials, will be completed in about a year. It will also provide warehouse and distribution for the 11 Western states, part of Texas, Alaska, Western Canada and Hawaii.

Williamson-Dickie Western warehouse

LOS ANGELES—Completion of a new $200,000 Western office and warehouse for Williamson-Dickie Mfg. Co., producers of work uniforms and casual clothes, has been announced. The new 22,000-sq. ft. facility is located at 2876 South Vail Ave. in the Simons Industrial Tract of Los Angeles. *E. P. Isacksen* is manager.

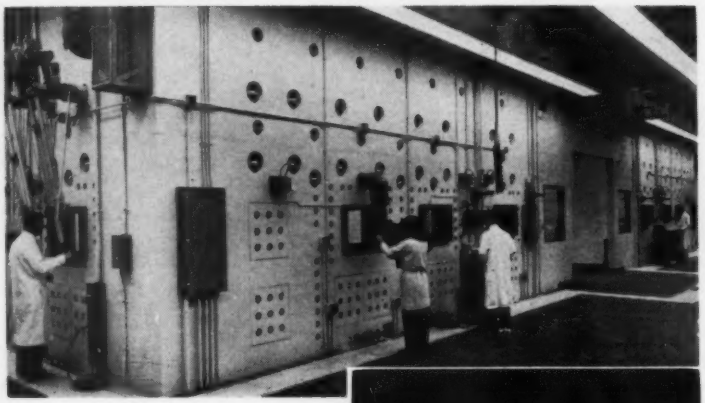
Purolator sales rep.

SAN FRANCISCO—Purolator industrial filters has named Jay Besore and Associates as sales representative of its industrial filters in Northern California and the entire state of Nevada with the exception of Clark County.

Convair adds facility

SAN DIEGO—A $680,000 facility for adhesive bonding of integral wing fuel tanks for Convair 880 jet transports is under construction at the San Diego plant of Convair Division of General Dynamics Corporation.

"Hot stuff" at new G.E. atomic lab



"HOT" CELLS in radioactive materials laboratory of the new Vallecitos Atomic Laboratory (near Pleasanton, Calif.) are manned by staff of the General Electric Co. facility. Housed in the laboratory are four test cells, shielded by high-density concrete three feet thick, for examination and test of material and equipment which have undergone nuclear irradiation. At right, **Lawrence O. Sullivan,** manager of the radioactive materials laboratory operations, uses intricate mechanical "hands" to place an irradiation capsule in chuck of remotely operated lathe. Lathe will be used to open fuel capsules for examination and repair.

New aluminum awning industry

STOCKTON, CALIF.—A new aluminum awning company will start production in Stockton. The company, Groff Awings, Inc., of Calif., has leased a 5,000-sq. ft. building at 435 West Scotts Ave.

Stephens Bros. Stockton warehouse

STOCKTON, CALIF.—Stephens Bros. will build a warehouse addition to its plant on West Fremont Ave. Estimated cost is $20,000.

Breuner's warehouse addition

STOCKTON, CALIF.—Breuner's are adding 50,000 sq. ft. to warehouse facilities located at 2050 East Fremont St. at a cost of $217,000.

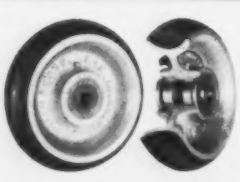
Johnson Gunite new quarters

GARDENA, CALIF.—Johnson Western Gunite Co., formerly located in San Pedro, has moved into new 36,000-sq. ft. quarters at 1355 West 190th St. Mailing address is P. O. Box 44, Gardena.

Ducommun to build Arizona warehouse, office

PHOENIX—Ducommun Metals & Supply Co. will build a 66,000-sq. ft. office and warehouse at the corner of 26th and Harrison. It is planned that the building will be completed by the end of this year. Equipment and inventories will represent an investment of over $1,000,000.

The new facility will replace the present buildings at 2626 East Washington. Division Manager is *Chester Cooper*.



NEW ALUMINUM "LOADMASTER"

. . . Industrial Wheel for Continuous Operation Systems

LOADMASTER, with bonded locked-in DuPont Neoprene tires, increased load capacity — same rollability. Resists fats, greases, acids, sun, heat and cold. Low operating temperatures eliminates internal heat as wheel problem. Sizes from 6 x 2 to 12 x 2½.

R&K INDUSTRIAL WHEELS

Send for new catalog. R & K Industrial Wheels, 1945 N. 7th Street, Richmond, Calif.

...for more details, circle No. 110 on Reader Service Postcard

BOTTOM-DUMP BARGES FOR SOUTHERN PACIFIC'S "UTAH NAVY"

MORRISON-KNUDSEN COMPANY, INC. CONTRACTORS

DESIGNED AND FABRICATED BY

Kaiser Steel
Fabricating Division

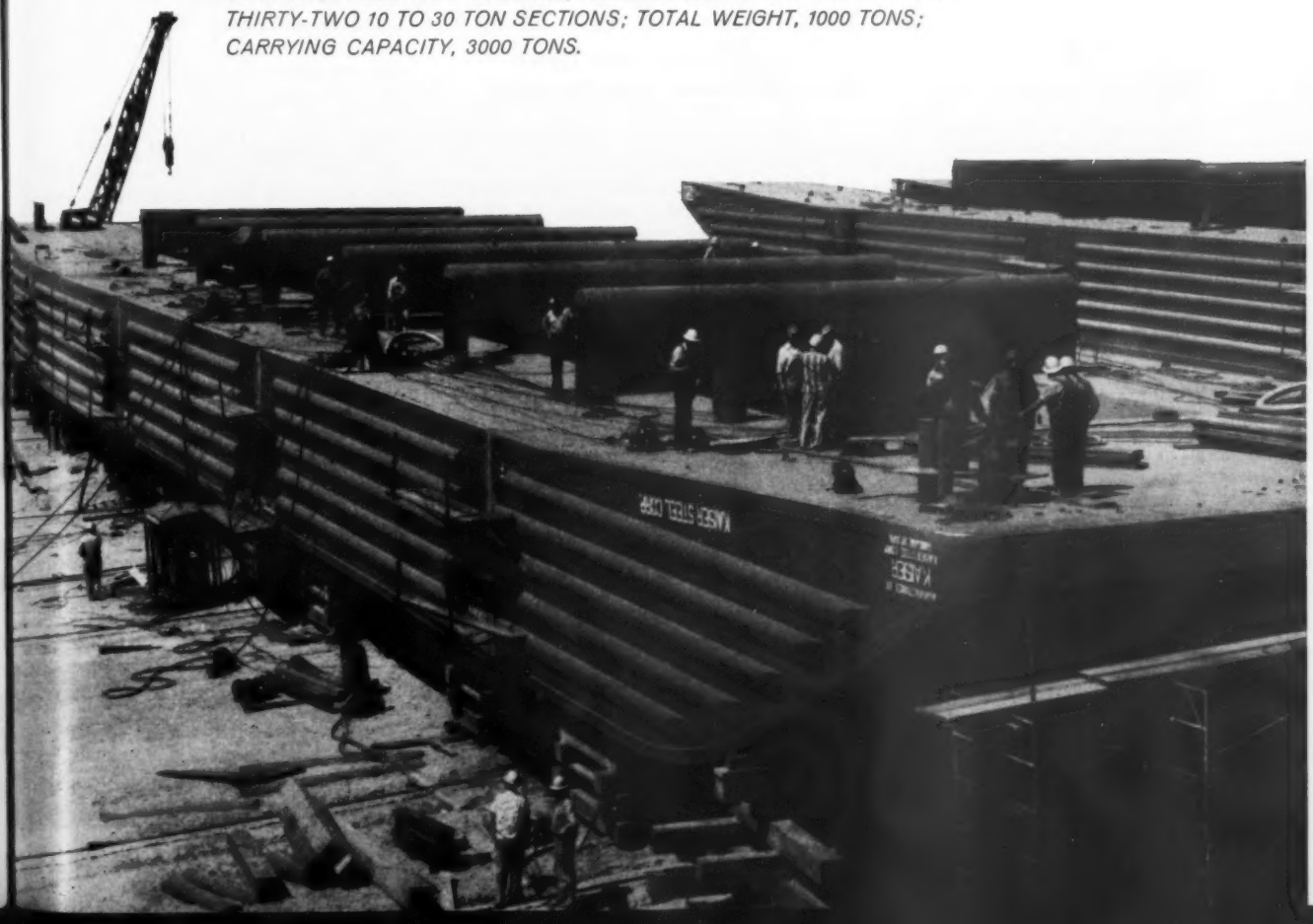
NAPA, FONTANA, MONTEBELLO, CALIF.

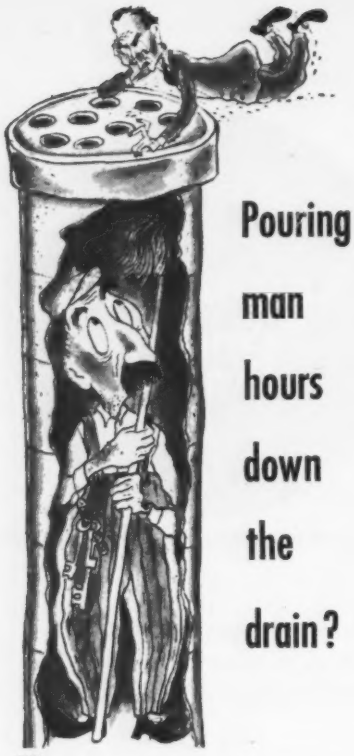
Built to serve the growing West...through precision steel fabrication

To build a $49,000,000 causeway across the Great Salt Lake, the Southern Pacific is using a "Navy" of six huge bottom-dump barges. After fabrication in our Napa, California, plant, each barge was shipped by rail in 32 giant sections to Utah for assembly on the lake shore. Another example of on-the-job cooperation by the Kaiser Steel Fabricating Division.

For further information, write Kaiser Steel Corporation, Fabricating Division, Napa, California.

STATISTICS: 250' X 55' OVERALL; ASSEMBLED AT LAKESIDE FROM THIRTY-TWO 10 TO 30 TON SECTIONS; TOTAL WEIGHT, 1000 TONS; CARRYING CAPACITY, 3000 TONS.





Pouring man hours down the drain?

Wasted hours in floor maintenance can clog up your whole profit and loss set-up.

LEGGE provides a waste-proof program of upkeep that accounts for every work hour of every day. What's more, LEGGE Polishes give longer wear per application. Even heavy traffic won't "walk 'em off". And they rarely need the labor-consuming job of stripping. Many buildings report savings of up to *33⅓%* with LEGGE Maintenance.

And here's a big Plus: LEGGE Polishes go up to *75% beyond* U. L. requirements for slip-resistance. You reduce slip-accidents along with the absenteeism that follows. And an improved Safety record is usually reflected in lower insurance rates. Want facts? Clip the coupon.

Installing Conductive Floors?

Improper maintenance destroys their effectiveness. LEGGE Cleaners and Polishes retain their conductivity. Send for Free booklet.

Walter G. LEGGE Co., Inc.
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New York 17, N. Y.
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J. W. Turner Company

Walter G. LEGGE Company, Inc.
101 Park Avenue New York 17, N. Y.

☐ O. K. Show me how LEGGE can save me money.

☐ Send Free booklet on conductive floor maintenance.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

...for more details, circle No. 112

Sticht instrument distribution

LOS ANGELES—Distribution in Southern California for Herman H. Sticht Co., Inc., New York manufacturer of electrical, electronics, and industrial instruments will be handled by Frank A. Emmet Co., Los Angeles manufacturers' representative.

Wrapmaster moving

PACOIMA, CALIF.—Schooler Mfg. Co., manufacturer of Wrapmaster automatic wrapping machines, has moved to a new address: 11341 San Fernando Road, P O. Box 65, Pacoima, Calif.

Harvey aluminum bar dist.

LOS ANGELES—Benjamin Metals Co., Los Angeles warehouse distributor for Harvey Aluminum, has been appointed to distribute Harvey's new hollow aluminum bar stock. Benjamin is the first distributor to warehouse this commodity.

Cadillac Plastic line

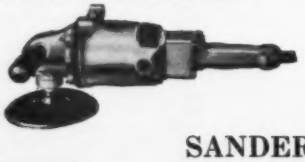
LOS ANGELES—Cadillac Plastic & Chemical Co. of Los Angeles, San Francisco and Dallas will distribute United Merchants Industrial Fabrics line of fiber glass cloths and woven rovings in the West. Cadillac will also maintain a fiber glass reinforced plastics advisory service for users.

Demo-Haines and Darco consolidate manufacturing

EL SEGUNDO, CALIF.—Demo-Haines Tool Corp. and Darco Industries, Inc., have announced a manufacturing consolidation. According to *M. J. Demo*, president of Demo-Haines, the demand for the Demo Rotary electric hammer has been so great that the former manufacturing facilities at Enid, Okla., were insufficient to maintain satisfactory production capacity.

Thus, manufacturing and sales activities of Demo-Haines will move to Darco's El Segundo plant.

BLACK & DECKER



SANDERS

IN STOCK AT

HSCO HOWARD SUPPLY COMPANY

...for more details, circle No. 113

National Carbon expands electrode warehousing

SAN FRANCISCO—*John M. Schreiner*, Pacific division manager of electrode products sales for National Carbon Co., Division of Union Carbide Corp., announces an expanded Western warehousing program for graphite electrodes.

Warehouses at Seattle, Portland, Los Angeles, and San Francisco will carry increased stocks of the sizes and grades of graphite electrodes most commonly used in these steel-producing areas.

Firestone Tire Portland facility

PORTLAND—Firestone Tire & Rubber Co. of California plans to construct an $800,000 combined district sales headquarters, home and auto supply warehouse, and tire retreading facility here. The new 150,000-sq. ft. facility will provide room for additional expansion of 107,000 sq. ft.

Litton Industries new plant

SALT LAKE CITY—Litton Industries will manufacture magnetrons, klystrons, and other electronic microwave tubes in a new 60,000-sq. ft. plant planned here. The Salt Lake City facility will be an addition to the company's Electron Tube division, in San Carlos, Calif.

Tool company Denver plant

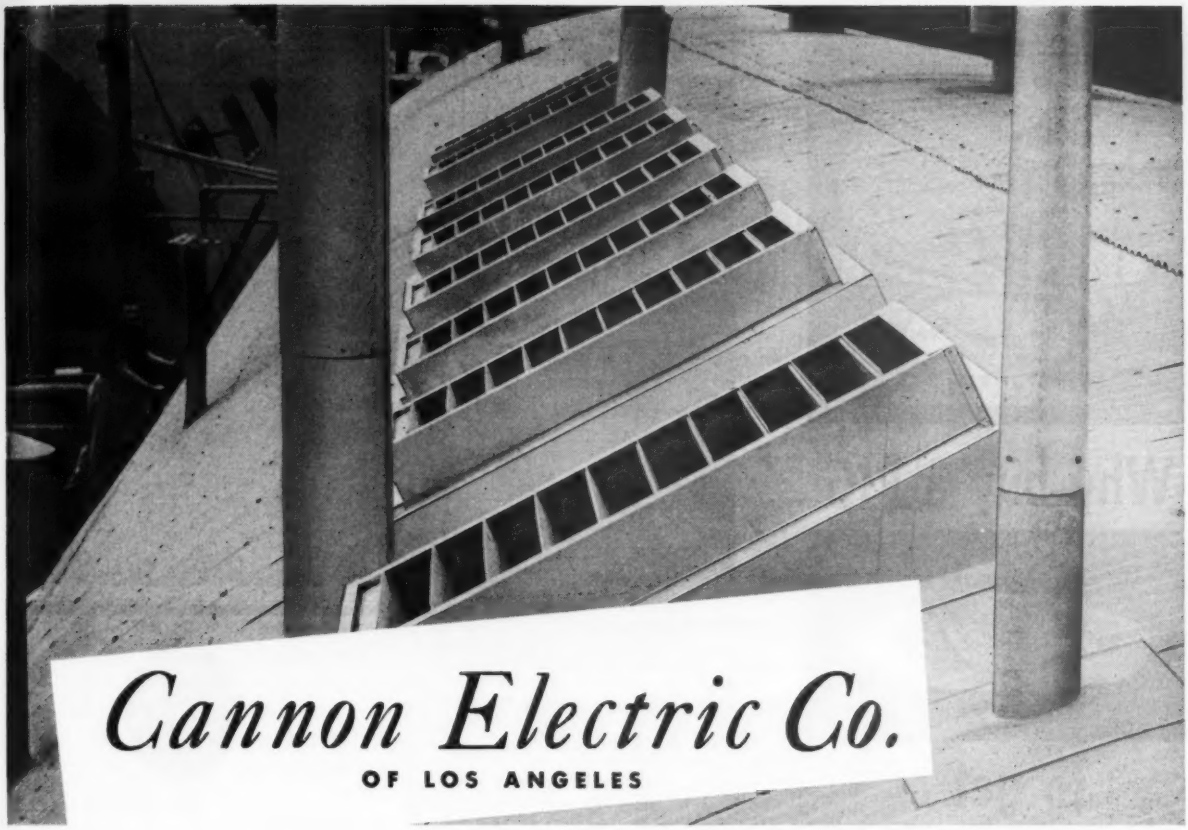
DENVER—A $500,000 manufacturing plant will be constructed on 14 acres at E. 44th Ave. and Monaco Blvd. by the B. K. Sweeney Mfg. Co., manufacturer of highly specialized tools and equipment for the aircraft and transportation industries. After the first phase of construction is completed in December, a 110,000-sq. ft. warehouse will be constructed adjacent to the new plant.

New Mexico uranium mill

AMBROSIA LAKE, NEW MEXICO—Construction is under way on a 3,300 ton-a-day uranium mill in the Ambrosia Lake area of New Mexico for Kermac Nuclear Fuels Corp. Total investment in the uranium plant will run about $30,000,000.

Riveria Vernon plant

VERNON, CALIF.—Riveria Manufacturing Co. will build a 24,000-sq. ft. plant in Vernon, announced *S. Bailey*, president of the firm.



took the "heat off" its Employees with **VENTILATION BY**

COLT

Extremely high temperatures were making working conditions intolerable for the electric furnace operators in the Canseal Division of the Cannon Electric Company of Los Angeles. The Colt Technical Staff was called in to make a free estimate. Their survey led to the installation of eight Colt Clear Opening Ventilators (shown here) plus one Colt Wall Inflow Unit. This installation successfully extracted the excess heat and gave relief to the operators with a subsequent increase in their morale and efficiency. Call Colt today for a free survey of *your* premises. Our "know-how" stems from the success of 28,000 installations throughout the world!

COLT Clear Opening VENTILATORS . . .

- *Sturdily built of anti-corrosive hardened aluminum*
- *Full clear opening gives maximum possible extraction*
- *Unique top and side drain channels on louvers guard against rain, adjustable louvers 100% rainproof when closed*
- *Can be installed in any type of factory roof, weighs just 23 pounds*
- *Built-in hand-operated control, no power required*

Write for ***Free Technical Manual*** *giving full details of the Colt System and equipment used.*

COLT VENTILATION OF AMERICA, INC.

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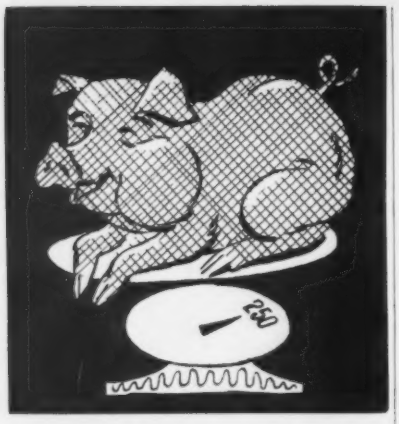
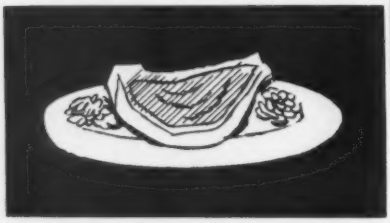


Why buy a PIG



to get a PORK CHOP?

Ridiculous? It sure is. But it's just as ridiculous to buy a vibrator and then pay to have it shipped out to the West Coast. Cleveland Vibrator Co. has a complete stock of air and electric vibrators in our San Francisco warehouse, ready for immediate shipment.

All sizes and types of Cleveland Vibrators are available. Our competent engineers will be glad to assist in making recommendations on the use of Cleveland Vibrators at your plant.

2914 Clinton Avenue • Cleveland 13, Ohio
7 Front St. • San Francisco 11, California
...for more details, circle No. 115

Vacuum metalizing machine solves problem

THE PROBLEM of embrittlement in cadmium plating has been solved at Lockheed Aircraft Corp. with the help of Anadite, Inc. Through the vacuum deposition of cadmium on steel parts, hydrogen embrittlement has been completely eliminated. Deposits of .0003 to .0005 can be uniformly maintained and deposits greater than this can be accomplished. The parts are suspended in a vacuum chamber and the cadmium is vaporized beneath them. No current is at any time passed through the parts, and they remain at practically room temperature throughout the process. Pictured above inspecting the controls for the vacuum metalizing machine are: **Erick Berger** (left), Lockheed Aircraft Corp., and **Gordon Jenkins** of Anadite, Inc.

PRECISION

TUF-CUT WHEELS

HSCO *IN STOCK AT* HOWARD SUPPLY COMPANY

...for more details, circle No. 116

ACCO's Great Chain...

ACCO for Better Values

ACCOLOY X-WELD 125

PATENT NO. 2763768

NOW—a chain with welds as strong or stronger than the material—welds with projecting lugs that prevent kinking! **Accoloy X-weld 125 Chains** hang straight as a die. Each link is perfectly formed.

THE SECRET IS IN THE WELD!

ACCOLOY X-WELD 125 has 2¼ times as big a welded area as possible with other welding processes. This means *more than double the security at the weld.*

ACCOLOY X-WELD 125 CHAINS are ideal for slings, bundling, towing, boomer, utility chains. Can be furnished in special analyses and heat treatments. Available in ¼", ⅜", ½", ⅝" and ¾" sizes.

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York, Pa., Atlanta, Boston, Chicago, Detroit, Houston, New York, Philadelphia, Pittsburgh, Bridgeport, Conn.

...for more details, circle No. 117 on Reader Service Postcard

American Potash & Chemical doubling production

TRONA, CALIF.—American Potash & Chemical Corp. is doubling production capacity of granular potash at its Trona plant.

The project—which will cost approximately $750,000—is part of the company's current $3,500,000 improvement program at the Trona plant. Installation of the new potash granulating units is being done in two parts, with the first half now nearing completion and the final half scheduled to be completed by the end of 1957.

Diversified Plastics new plant

HUNTINGTON PARK, CALIF.—Diversified Plastics, Inc., has moved into a new 10,000-sq. ft. plant at 2129 E. Florence Ave. The move is part of an expansion program in which Diversified has added new facilities to its plastic coating and fabrication lines.

Weldaloy Western division offers copper alloy products

BURBANK, CALIF.—Announcing that it is "the first of the nation's copper alloying firms to take a Western step," Weldaloy Products Co. has established a Western division at 1209 Chestnut St. The division will be operated by "men qualified in all phases of resistance welding."

Besides copper alloy parts and components for tube mills, the Weldaloy Western division offers a full selection of copper alloy bar stock, standard and special spot welding electrodes, copper alloy forgings and castings, electrode holders, adaptors, electrode shanks and caps, accessories and seam welder wheel electrodes.

Thalco new warehouse

LOS ANGELES—Thalco Glass Fiber Products Co. will move into a new 50,000-sq. ft warehouse and office building at 6431 East Flotilla St. in the Vail Field Tract.

Viking Supply new quarters

OAKLAND—Viking Supply Co., distributor for NYB&P Gilmer "Timing" belts and mechanical rubber goods, Ramset and Sure-Set fasteners, Lubriplate, Leschen wire rope, and Great Western manila rope, has moved into new and larger facilities at 4545 Oakport St.

EECO completes move

SANTA ANA, CALIF.—Electronic Engineering Co. of Calif. completed its move to a new $500,000 plant at 1601 E. Chestnut St. The firm is engaged chiefly in missile instrumentation equipment for the Defense Dept.

AiResearch expansion complete

PHOENIX, ARIZ.—Expansion of electronic and pneumatic control facilities at the Garrett Corporation's AiResearch Mfg. division totaling 40,000 sq. ft. is now complete. The construction—in addition to the 500,000 sq. ft. already in operation—will house 500 workers engaged in the company's growing electronic and valve business.

Stauffer expands lab.

RICHMOND, CALIF.—Stauffer Chemical Co. has begun construction on a major addition to its research laboratories. It is anticipated that the extension, which will cost several hundred thousand dollars, will be completed by early fall.

Heath triples facilities

KENT, WASH.—Heath Mfg. Co., manufacturer of machines, parts, and machine assemblies, will triple its facilities by adding more than 13,000 sq. ft. to its plant north of the city. The Heath company is a subcontractor for Boeing.

HOSPITAL OF THE GOOD SAMARITAN

This famed institution founded and operated by the Episcopal Diocese of Los Angeles, was enlarged recently, now has 503 beds.

Unretouched photo used by permission.

A Welcome with Beauty and Safety

Patients entering the Hospital of the Good Samaritan are received in this attractive Admitting Lobby, where lustrous floors add to the pleasant atmosphere and the feeling of safety underfoot inspires confidence.

This floor area, like the several hundred thousand square feet of other hallways and rooms throughout the hospital, is maintained with Columbia Floor Care Products, according to Mrs. Margaret Bonella, Executive Housekeeper. With Columbia Floor Care Products, the Good Samaritan housekeeping staff is able to keep floors beautiful and safe despite busy around-the-clock traffic.

Ask your Columbia representative to show you the new Columbia floor polishes that give floors more lustre, greater safety underfoot and more durability – with less maintenance.

Columbia Wax Company

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600 Sixteenth Street, Oakland 1, Calif. • Highgate 4-5913

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MOVE HEAVY PRESS DIES EASIER

WITH SPECIAL

Weld-Bilt

WINCH-EQUIPPED

ROLLER TOP

Those extra heavy dies move on and off your big presses with surprising speed and little effort — with this new Weld-Bilt Hydraulic Lift Platform. Just move the platform to the press, raise or lower it to proper level, secure the cable hook, push a button, and the motor driven winch pulls the die or other heavy unit over the free-running rollers — on or off your press.

Built to handle 20,000 lbs., this new unit, 48" x 96" long, has two sets of conveyor rollers, with a special motor driven winch mounted on one end. Platform is raised or lowered by means of two-way foot pedal control operating hydraulic pump and motor. Steel wheels and swivel front casters, plus tow-bar, permit easy movement and positioning of the table. Similar Weld-Bilt units can be designed to various sizes and capacities to 30,000 lbs.

You, too, may have a lift-or-move problem in heavy equipment. Weld-Bilt engineers can offer a profitable solution. Write, we'll be glad to supply details.

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Weld-Bilt Vertical Floor to Floor Transportation Systems — Lift Trucks — Portable Elevators — Automatic Elevators.

WEST BEND EQUIPMENT CORP.
MATERIALS HANDLING ENGINEERS

307 WEST WATER STREET • WEST BEND, WIS.

...for more details, circle No. 119

Acme Appliance plant

MONROVIA, CALIF.—*Herbert Hezlep, Jr.*, president of Acme Appliance Manufacturing Co., has announced start of construction on 25,000-sq. ft. manufacturing plant to be located at 210 Railroad Ave. The new plant, scheduled for completion in August, will act as headquarters for the company, manufacturer of sliding and folding door hardware and other builders' hardware specialties.

Japanese firm plans Alaska pulp mill

SITKA, ALASKA—A $55,500,000 pulp mill will be built here by the Alaska Lumber & Pulp Co., a subsidiary of Alaska Pulp Co., Ltd., Tokyo, Japan. Construction is expected to start this summer and be completed by the summer of 1960.

The pulp is expected to be baled and shipped to Japan for processing into rayon and cellulose products.

Maas Chemical plans new plant at Richmond

RICHMOND, CALIF.—The A. R. Maas Chemical Co. has taken an option on 75 acres of land at Richmond. The first construction planned is a phosphoric acid plant and a catalyst plant, said *Raymond L. Geller*, president of the firm.

The A. R. Maas Co., division of Victor Chemical Works, has its office and plant at South Gate, Calif., where sodium phosphates, photographic chemicals and organic chelating agents are manufactured.

North Hollywood warehouse

NORTH HOLLYWOOD, CALIF.—Randall Engineering Co. will build a $55,000 warehouse at 7254 Coldwater Canyon Ave. for Wm. F. McChesney. The building will contain 16,000 sq. ft.

PLUMB

HAMMERS

IN STOCK AT

HOWARD SUPPLY COMPANY

...for more details, circle No. 120

Introducing the NEW, BIGGER 56 HP.

Model VR4D WISCONSIN 4-CYLINDER *Air-Cooled* ENGINE...

Model VR4D Open Engine with heavy-duty clutch, rotating screen, electrical equipment and pre-cleaner.

• Climaxing years of engineering development, this great new engine offers manufacturers and users of power equipment all the advantages of AIR-COOLING, at temperatures from low sub-zero to 140° F., in an exceptionally rugged engine that measures up to any "heavyweight" industrial type liquid-cooled engine, horsepower for horsepower, with many *plus values.*

The outstanding High Torque characteristic of the Model VR4D engine, combined with its extremely rugged construction and heavy-duty stamina, provide *load-lugging holding power*, long life and top power performance.

Advanced "V" design provides an extremely compact power package, plus all traditional Wisconsin heavy-duty features such as tapered roller main bearings.

This new engine rounds out a complete line, comprising 15 models in 4-cycle single cylinder, 2- and 4-cylinder sizes, from 3 to 56 hp. Write for "Spec" Bulletin S-207.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

...for more details, circle No. 121 on Reader Service Postcard

Ames plant in operation

MILPITAS, CALIF.—The first section of W. R. Ames Company's new $750,000 main plant is completed and now in operation. In addition to the 35,000-sq. ft. tube manufacturing plant, where two tube mills have started production, the firm has also completed a 30,000-sq. ft. warehouse for parts, and a 90,000-sq. ft. loading and storage platform. Ames manufactures aluminum irrigation equipment.

North American land option

RENO, NEVADA—North American Aviation, Inc., has acquired options to purchase approximately 12,600 acres of land in Washoe County, Nevada—about 10 miles northeast of Reno, off state highway 33. No final decision has been made to purchase the land, nor have any construction plans been announced.

Garrett Supply distributes Dexion steel framing

LOS ANGELES—The Garrett Corporation's Garrett Supply division, 3844 S. Santa Fe Ave., has added Acme Steel Dexion to its Famous Brands inventory.

Dexion is a slotted angle framing material which has many industrial applications, including storage racks, tables, catwalks, shelving, conveyor framework, etc.

Container-paper companies merge into Weyerhaeuser

TACOMA, WASH.—Kieckhefer Container Co. and the Eddy Paper Corp. have merged into Weyerhaeuser Timber Co. Kieckhefer-Eddy facilities, which include shipping container and milk carton plants throughout the nation, will be operated as the Kieckhefer-Eddy division of Weyerhaeuser Timber Co.

Bethelhem buys Wash. land

SEATTLE, WASH.—Bethlehem Pacific Steel Corp. has purchased an 18-acre tract of land on East Marginal Way south of the Boeing Airplane plant. No plans have been announced as yet.

Graybar warehouse, office

VAN NUYS, CALIF.—Graybar Electric Co., Inc., will build a 36,500-sq. ft. warehouse and office building at 15520 Cabrito Rd., Van Nuys.

Service Air facility

GLENDALE, CALIF.—A $35,000 storage and assembly building is being constructed by Service Air Co. at 1841 Flower St.

Burlington Mills warehouse

LOS ANGELES, CALIF.—Burlington Mills will build a 10,000-sq. ft. warehouse at 4400 Worth St. Cost will be around $39,000.

Brunswig Drug plans warehouse, factory

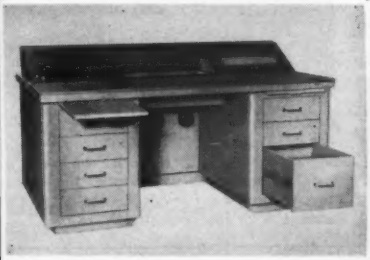
ANAHEIM, CALIF.—A $200,000 warehouse and factory will be constructed for Brunswig Drug Co. at 900 E. Vermont.

The 50,000-sq. ft. facility will have tilt-up concrete construction, structural steel work, composition roofing and slab floor.

Pasa Air new factory

PASADENA, CALIF.—Pasa Air Products is building a one-story factory building at 2710 E. Foothill Blvd. Cost is approximately $54,000.

AUTOMATIC BRAIN



SARA, T&C'S AUTOMATIC BRAIN MONITORS ENTIRE PLANT OPERATIONS!

Observes, annunciates, records in writing every variation in equipment operation. Supervises as many as 500 separate functions. Costs only slightly more than an ordinary annunciator.

Write TODAY for free booklet

Manufactured by
Taller & Cooper, Inc.
Brooklyn, N. Y.

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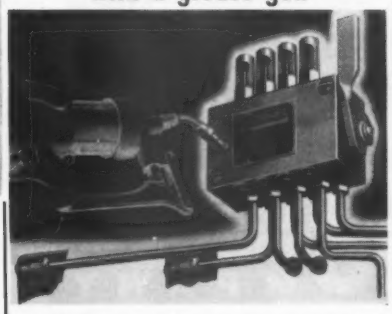
MultiVal System

provides centralized lubrication with a grease gun



• MultiVal provides low-cost centralized lubrication for small groups of bearings. It does not require a permanently mounted central pumping unit or supply line piping.

With MultiVal, as many as twelve bearings can be reached at one time from a single grease gun connection and served with measured amounts of lubricant. Bearings are lubricated from one safe, convenient central point, and amount delivered to each bearing is adjustable. Thus, MultiVal offers the advantages of a complete centralized system of lubrication at substantially lower cost.

Ask for Farval Bulletin 26-R.

FARVAL CENTRALIZED *Lubrication Systems*

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— two of the SUPERIOR PRODUCTS supplied by —

For SOMERS Superior PETERSON CO. Products

representing in addition to the above —

"American" Flexible Metal Hose
"American" and "Amerigear" Flexible Couplings*
"Cleveland" Worm Gear Speed Reducers*
"Hassall" Special Cold-Headed Products
"Hapman" Tubular Conveyors*
"Kupfrian" Push-Pull Controls
"Elliott" Flexible Shafting
"Kahn" Test Stands and Dry Air Equipment
"Lowell" Heavy-Duty Reversible Ratchet Wrenches
"Veeder-Root" Counting Devices

SAN FRANCISCO — 157-13th St. — Phone MArket 1-2255
LOS ANGELES — 1501 Maple Ave. — Phone RIchmond 9-6151

*Northern California Only

Factory, warehouse building

PANAROMA CITY, CALIF.—Glenn Hoiby, 16045 Royal Oaks Rd., Encino, is constructing a 40,000-sq. ft. factory and warehouse at 14629 Titus St. Cost will be approximately $125,000.

Lawry's Products warehouse

LOS ANGELES—Lawry's Products Co. plans to build a one-story warehouse addition of 132,000 sq. ft. at 568 San Fernando Rd.

FAULTLESS

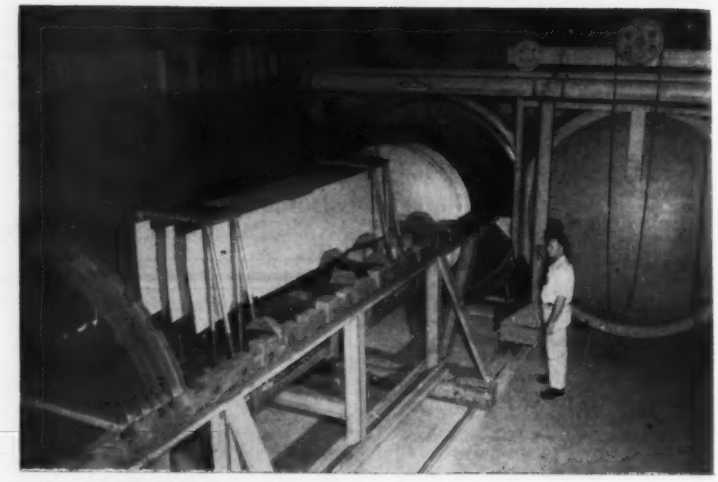
CASTERS

IN STOCK AT

HOWARD SUPPLY COMPANY

...for more details, circle No. 123

World's largest heat treating vacuum furnace



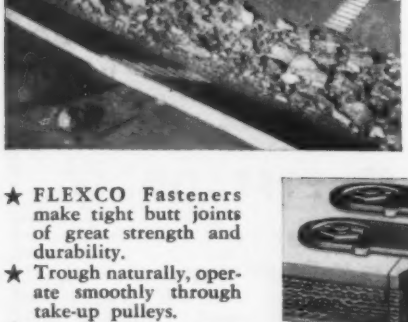
UNIQUE IN THE MISSILE INDUSTRY is this heat treating vacuum furnace for processing titanium parts for North American Aviation's "Navaho" guided missile. The furnace is over 40 ft. long with a work chamber in excess of 14 ft. in length and 6 ft. in diameter. Parts are rolled inside on rails. The furnace was built by Lindbergh Engineering Co. of Chicago and the furnace by the F. J. Stokes Co. of Philadelphia. In this picture, **John Robbins** is at the controls.

$20,000,000 mining facility planned near Tucson

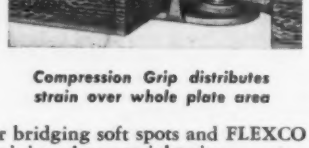
TUCSON, ARIZ.—Duval Sulphur & Potash Co. announced it plans a $20,000,000 copper and molybdenum concentrator at a site 25 miles southwest of here. The concentrator will be capable of handling 10,000 tons a day. Construction will start within a few months.

FLEXCO®

BELT FASTENERS and RIP PLATES



FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH



Compression Grip distributes strain over whole plate area

★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

Order From Your Supply House. Ask for Bulletin F-112

FLEXIBLE STEEL LACING CO.
4642 Lexington St., Chicago 44, Ill.

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Save money with Empire Buildings. One contract, turnkey construction—all work guaranteed. 100% Financing available, also low cost leasing. Quality at a price.

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Write today for catalog and information.

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EMPIRE STEEL BUILDINGS CO.
STEEL AND CONCRETE CONSTRUCTION—TURNKEY JOBS

2137 Marianna Ave., Los Angeles 32, Calif.

...for more details, circle No. 125 on Reader Service Postcard

Ryan acquires site near Torrance airport

TORRANCE, CALIF.—The Ryan Aeronautical Co. has acquired an assembly plant and a 27-acre industrial site adjacent to the Torrance Municipal Airport.

The factory facilities, containing 137,000 sq. ft. of floor space formerly occupied by National Electric Products Corp., will be used for assembly of the DC-8 jet airliner power packages and pylons, and the Firebee jet drone missile.

Office, industrial building

LOS NIETOS, CALIF.—Conwell & Associates, 919 S. Garfield Ave., Los Angeles, is preparing working drawings for construction of a two-story office building and industrial plant for a client. The facility will contain 92,400 sq. ft. of floor space.

Flintkote unit to build plant

LAS VEGAS, NEV.—A subsidiary of Flintkote Co., the United States Lime Products Corp., will build a plant at Arrolime, 19 miles southwest of here. The new plant will be used for the manufacture of lime flux used in steel making. Capacity will be over 400 tons of lime products a day.

Firestone to build warehouse

PORTLAND, ORE.—Firestone Tire & Rubber Co. has purchased ten acres in the Union Pacific's Rockwood Industrial District and will construct an $800,000 combination warehouse and tire retreading facility at this location.

Wilson Sport Goods warehouse

EAST LOS ANGELES—Wilson Sporting Goods Co. of Chicago, Ill. is taking bids for construction of a 27,000-sq. ft. office and warehouse.

Western Aluminum addition

EAST LOS ANGELES—Working drawings are being prepared for the construction of a factory building addition for Western Aluminum Rolling Mills. The building will have composition roof, concrete slab and aluminum sash.

Warehouse, office building

LOS ANGELES—Lesser Industrial Properties will construct a 15,000-sq. ft. office and warehouse building at 5915 Browcroft St. Total cost is approximately $45,000.

Consolidated Paper warehouse

VERNON, CALIF.—Consolidated Paper Co. plans to build a 56,000-sq. ft. office and warehouse on Soto St. Requests for subcontract bids have been let.

Braun Co. opens Rialto branch

RIALTO, CALIF.—The Robert H. Braun Co., Southern California distributors of Clark material handling equipment, has announced the opening of a new sales and service branch here. The Rialto branch will provide sales and service for powered material handling equipment in Riverside and San Bernardino counties.

Grant Oil addition

VERNON, CALIF.—Grant Oil Tool Co. will build a 23,000-sq. ft. addition to its office and shop building at 2042 E. Vernon Ave. Cost is approximately $155,000.

Van Nuys warehouse

VAN NUYS, CALIF.—A $60,000 warehouse will be constructed at 7808 Sepulveda Blvd. for Esther Davis Gresinger, 7627 Van Nuys Blvd., Van Nuys.

Union Oil warehouse

LOS ANGELES—Union Oil Co. plans to build a 12,000-sq. ft. warehouse in the southern section of Los Angeles. The building will have concrete walls, structural steel work, composition roofing and slab floors.

Los Angeles Drug warehouse

ANAHEIM, CALIF.—The Los Angeles Drug Co. plans to build a 50,000-sq. ft. warehouse and office.

Venice district factory

LOS ANGELES—A $150,000 factory will be constructed at 12965 Panama St., Venice District, for Al Lushing. The building will cover 50,000 sq. ft.

Alpha Beta warehouse

LA HABRA, CALIF.—Alpha Beta Markets is constructing a 22,000-sq. ft. concrete warehouse at 1111 Fullerton Rd.

KENNEDY

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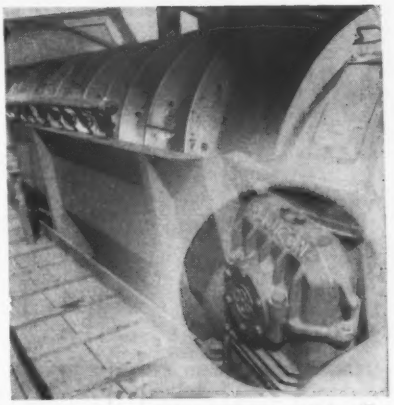

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...for more details, circle No. 127

Arcadia Glass facility

ARCADIA, CALIF.—Construction is now under way for a $200,000 office and warehouse for Arcadia Glass & Mirror Co. The 11,000-sq. ft. facility will be located at 305 N. Santa Anita Ave.

$5,000,000 brick plant slated near Chino

CHINO, CALIF.—A subsidiary of the Higgins Brick Co. of Los Angeles plans to construct a $5,000,000 brick plant near Chino.

New Douglas jetliner plant

THE NEW $20,000,000 DC-8 jetliner manufacturing plant of the Douglas Aircraft company was dedicated recently at its location, on a 55-acre site on the east side of Lakewood Blvd., south of Carson St. in Long Beach, Calif. Floor space of the buildings is equivalent to 18 football fields, or approximately 1,000,000 sq. ft.

Milk firm plans $500,000 expansion

LOS ANGELES—Jerseymaid Milk Products Co. will undertake a $500,000 expansion program to modernize existing plant facilities at their main plant location, 1040 West Slauson Ave. *W. John Thiesen*, president, said that expansion plans call for a two-story addition with a cold storage room, new milk processing room and office additions.

CRESCENT

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IN STOCK AT

HSCO HOWARD SUPPLY COMPANY

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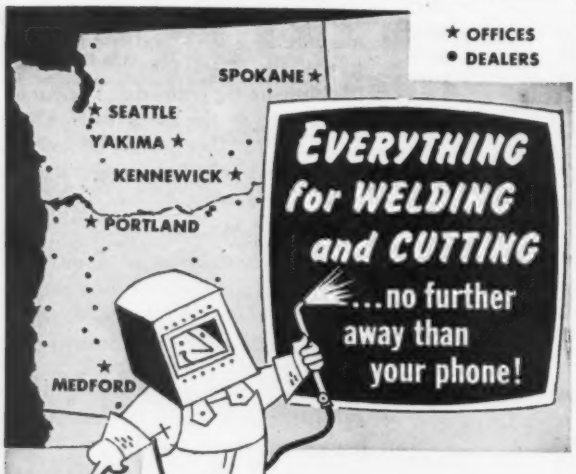

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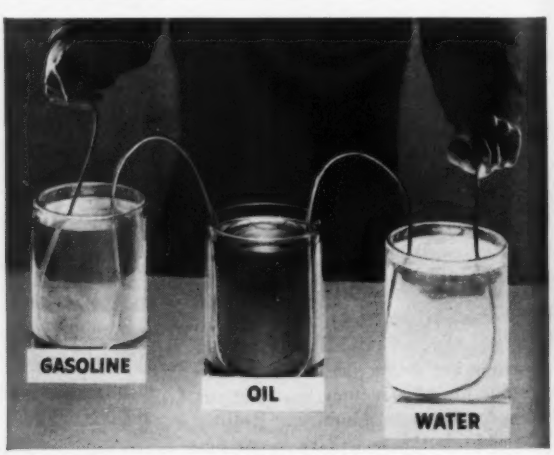

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57286

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WESTERNERS AT WORK . . .

Crown Zellerbach Corp.

. . . promotes *J. W. Kincaid*, formerly sales manager, Multiwall Bag sales, to manager of the newly formed Multiwall Bag sales division . . . and *K. M. Aslin*, formerly sales manager of Specialty Paper, Board & Pulp sales, to manager of the newly formed and renamed Industrial Paper sales division. *E. P. Partland*, assistant vice president for General Paper sales, will be responsible for

J. W. Kincaid

K. M. Aslin

the specialized activities of Fiber Overlay (Crezon) sales and Tabulating Card sales. *W. R. Works* is manager of the former and *L. Lawrence* manager of the latter.

Standard Steel Corp.

. . . of Los Angeles names *Harry Vinock* as technical sales specialist on Standard-Hersey rotary dryers for sewage sludge and industrial waste treatment. Vinock, a specialist on heat transfer, drying and entrainment problems, will be responsible for sales and promotion of Standard-Hersey rotary processing equipment, gas scrubbers, entrainment separators and auxiliary equipment for sewage sludge drying, industrial waste drying and petroleum processing.

Hyster Company

Phillip S. Hill

. . . appoints *Philip S. Hill* as vice president in charge of all operations. Hill, with Hyster for 20 years, has been vice president in charge of sales until last December. Over the years, he has been involved in practically all phases of management activities including sales, service, engineering, purchasing and production.

The Oilgear Co.

. . . Milwaukee, Wisconsin, manufacturer of application-engineered fluid power equipment, announces the appointment of *Carl L. Gosewehr* as district manager of Oilgear

R. C. Hurtienne

C. L. Gosewehr

Western offices located in Los Angeles and Seattle. *Robert C. Hurtienne* has been appointed district manager of the Oilgear Seattle office.

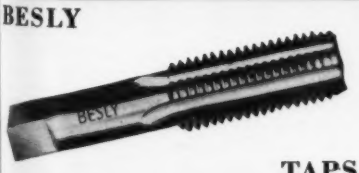
Mullenbach Division

. . . of Electric Machinery Mfg. Co., Los Angeles, announces the association with the company of *Harold W. Welton*, as an engineering representative. Welton brings many years of experience in the electrical industry into the organization. His experience in the electric utility field, as well as his knowledge in the application of switchgear, will be an asset in the proper application of Mullenbach's products.

Simpson Timber Co. of Seattle

. . . announces the appointment of *Gordon J. Manary* as vice president and general manager of Simpson Redwood Co. in Arcata, Calif.

BESLY



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Granberg Corp.

R. C. Anderson

. . . Oakland, Calif., appoints *Robert C. Anderson* as general manager. Anderson served for many years as sales manager and, prior to that, as production manager. In addition to his new appointment, Anderson was re-elected vice president of the firm. *Randy Murphey* was promoted to the position of general sales manager to replace Anderson. Murphey has been district manager for the Granberg organization for several years. *A. S. Kozman*, formerly owner and manager of Cook's Oil Co., has joined Granberg's sales staff as local district manager to replace Murphey. Granberg manufactures Granco pumps and meters.

A. S. Kozman

Randy Murphey

J-F Sales Co.

. . . is a new electronic manufacturers' representative organization established at 1001 Glendale Blvd., Los Angeles, by *Jack W. Falck* and *John R. Foster*. Selling electronic components and instruments, the firm covers the Southern California, Arizona and southern Nevada markets.

Wheel Industries, Inc.

. . . a Los Angeles subsidiary of the Budd Co., names *Robert Miller* as manager. Miller was former sales manager of the Los Angeles firm. The company is a distributor of Budd Wheels and general truck equipment. It is located at 2600 S. Santa Fe Ave.

Huck Mfg. Co.

. . . designates two new engineering representatives to serve West Coast customers in their riveting and fastening process problems. They are *William B. Huegin* and *E. C. Sallen*.

PORTER

BOLT CUTTERS

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Computer-Measurements Corp.

. . . appoints G. E. Moxon Sales, California electronic engineering representatives with offices in Los Angeles and San Mateo, as technical sales and service representatives for the states of California, Arizona and Nevada. Computer-Measurements manufactures digital counting, timing and controlling instruments.

C & H Supply Co.

. . . manufacturers of Metal-Cals, promotes *Jim Colfer*, a five-year veteran, to head up its new product sales, and appoints *Jim Collins*, a six-year veteran, to head up its expanded research and development program.

Hughes Aircraft Co.

. . . names *Dr. Russell R. Law* as director of new product development for Hughes Products Group, the company's commercial activity. Dr. Law will make his headquarters at the Los Angeles International Airport facility of Hughes Products. Fields covered include microwave and cathode-ray storage tubes, instruments, electro-mechanical components, electronic systems and controls.

Westinghouse Electric Corp.

. . . Sunnyvale, Calif., division, appoints *Leonard N. Goodell* as manager of electrical products and *Fenton L. Tippett* as manager of mechanical products. Establishment of the two new departments as integrated profit centers was made in line with the recent elevation of the plant to divisional status, explained *James S. Hagan*, division manager.

L. N. Goodell

F. L. Tippett

Air-Mac, Inc.

I. H. McGinnis

. . . announces the appointment of *Irving H. McGinnis* as manager of the Spokane office. McGinnis was service manager of Air-Mac in the Seattle office for eight years and transferred to the sales division of the same office. He transferred to the Spokane sales office three years ago.

United Concrete Pipe Corp.

. . . selects *James A. Mitchell* as production manager of the Baldwin Park, Calif., firm. Mitchell formerly held the post of plant superintendent of Standard Steel Corp. In his new position, Mitchell will be responsible for all operations, estimating, and engineering in all United Concrete Pipe's 17 plants throughout the West. United Concrete Pipe, a subsidiary of U. S. Pipe & Foundry Co., produces fabricated steel products as well as all types of concrete pipe.

U.S.S. Consolidated Western Steel Div.

F. M. Aspey

. . . appoints *Frederick M. Aspey* as district manager of the Southwest district. With headquarters at Consolidated Western's plant in Phoenix, Arizona, Aspey will supervise the firm's sales, manufacturing and field activities in Arizona and New Mexico. Aspey is a native of Phoenix.

Aeroquip Corp.

. . . promotes *Allan B. Fredhold* as general manager of General Logistics. Aeroquip subsidiary located in Pasadena, Calif. Fredhold was formerly plant manager of General Logistics and had previously held the position of staff engineering manager at the Western division of Aeroquip Corp.

Flick-Reedy Corp.

. . . of Melrose Park, Ill., appoints *Joseph R. Smith* as Western district manager. Smith will be responsible for sales in all states west of the Mississippi for the firm's two divisions—Miller Fluid Power division, industrial hydraulic and air cylinders; and Tru-Seal division, producer of a self-sealing pipe fitting.

Solar Aircraft Co.

C. D. Oberg

. . . names *C. D. Oberg* as director of sales. A native of San Diego, Oberg has been with Solar for 18 years. His most recent position has been manager of aircraft and engine component sales. He has worked at both the San Diego and Des Moines plants and in field sales offices.

Beckman Instruments, Inc.

. . . Spinco Division, Palo Alto, Calif., appoints *Ernest M. Whitley* as production engineer. Whitley will be responsible for industrial design programs concerned with the production of Spinco instruments for medical research. *Anthony Del Duca* has been selected as chief electronics engineer for the Process Instruments division of Beckman Instruments.

Consolidated Electrodynamics Corp.

. . . appoints *William M. Hawkins, Jr.*, as sales manager of Electronic Industries, Inc., Pasadena, Calif. The division specializes in printed wiring, transistor circuitry, and portable test instruments. Hawkins headed CEC's technical training program during 1956 and is a former manager of the company's Los Angeles district sales office.

Forest Fiber Products Co.

. . . Forest Grove, Ore., appoints *Henry B. Jacobsen* as sales manager. The firm manufactures forest hardboards. Jacobsen was sales manager for the Southwest division with headquarters in Los Angeles. In his new post he will coordinate all sales activities. *Saul Zukerman* has been appointed industrial sales representative for Southern California.

CLASSIFIED SECTION

Space is sold as advertisers' inches. All advertisements in this section are ⅛ inch short of contracted space to allow for borders and composition. Rates are $12.00 a column inch. Copy should be sent in by the 25th of preceding month if proofs are required; by the 28th if no proofs are required.

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609 Mission St., San Francisco 5

U.S.S. Columbia-Geneva Division

. . . appoints *James W. Rimmer* as manager of sales in charge of the Portland office. Rimmer succeeds *Elbert W. Foudray* who is being assigned to other sales duties. The new Portland manager was manager of sales in the Salt Lake City office since April 1953.

Ducommun Metals & Supply Co.

. . . names eight men to new management positions. They are: *Tom Alexander*, training director; *Bob Jones, Steve Kennoy*, and *Lee Parsons*, sales managers; *Dave Martin*, manager of inside sales; *Ed Ramp*, steel department manager; *Jim Toland*, project control manager; *Warren Carroll*, traffic manager.

Woodbury and Co.

. . . of Portland, Ore., names *Glen M. Ede* general manager of the firm. Woodbury and Co. is one of the Northwest's largest dealers in steel, industrial supplies and heavy hardware. Prior to his Woodbury appointment, Ede for the past 10 years has been vice president in charge of sales for Transitier Truck Co.

The Standard Pressed Steel Co.

. . . appoints *James C. Humphries* as manager of its Western district and *George Barnett* as a salesman in the territory. Humphries will make his headquarters in the SPS Western warehouse, 742 Lairport, El Segundo, Calif.

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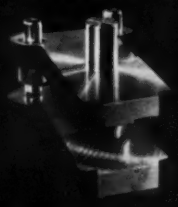

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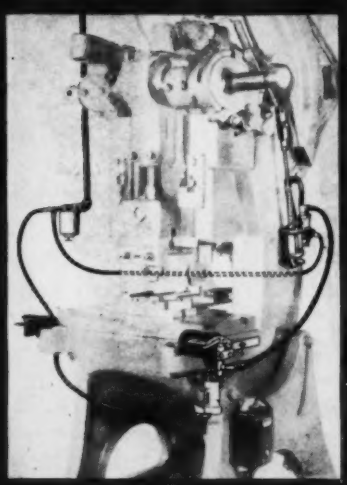

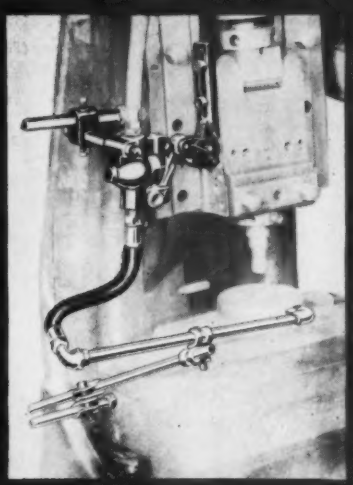

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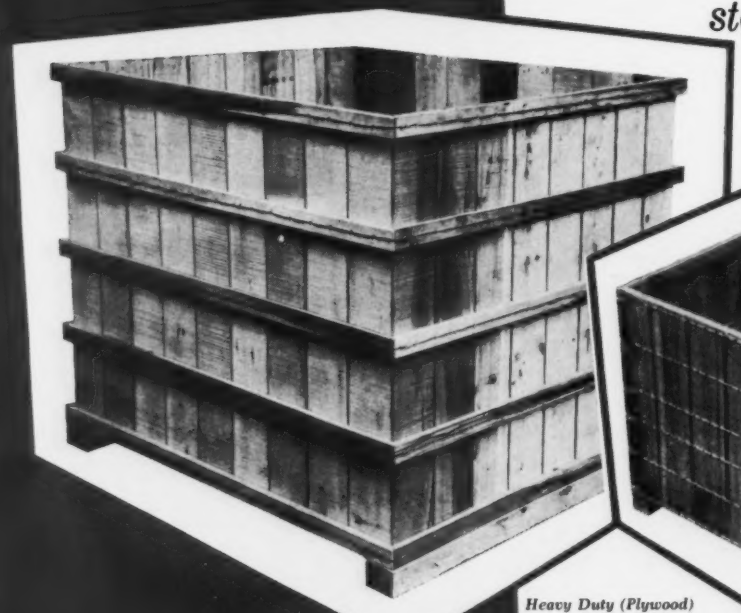
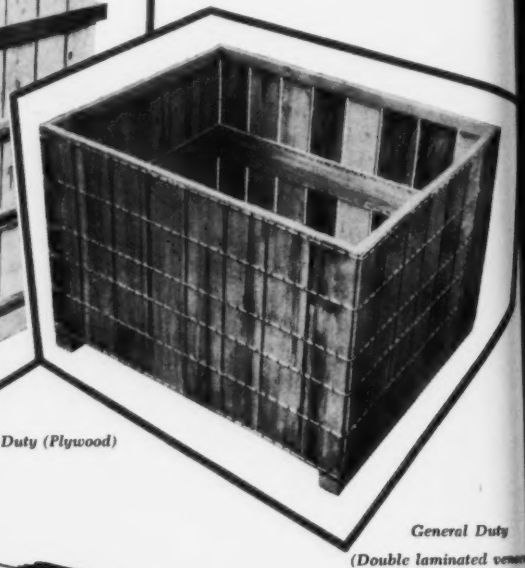
LIFTAINERS

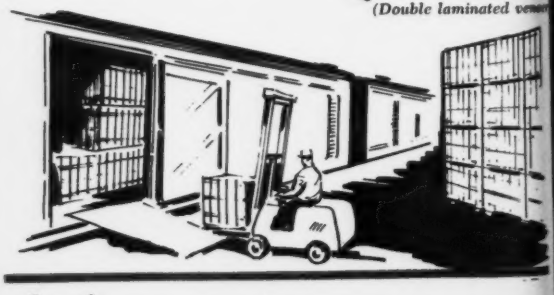
the new way to step up efficient handling, storage, shipping... and profits



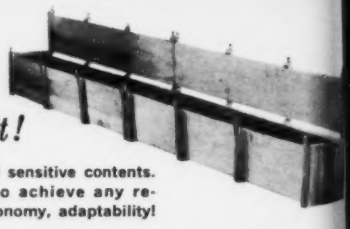
Heavy Duty (Plywood)



General Duty
(Double laminated veneer



here's protection as l-o-n-g as you want it!



Smooth inner sides protect sensitive contents. Units clamp end-to-end, to achieve any required length. Strength, economy, adaptability!

...for more details, circle No. 138 on Reader Service Postcard